



**Electrical
Insulators &
Accessories**

ECMEI

By ELSEWEDY ELECTRIC

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INTRODUCTION

ELSEWEDY ELECTRIC

75 years ago, we started with a clear vision to position Elsewedy Electric for successful growth, inspired by innovation, determination and spirit of hardworking staff, empowered and liberated by a strong enterprise system.

Since Elsewedy Electric started, we made the same motto did not change till today... Behind our success is a professional dedicated team and latest technologies which deliver comprehensive product portfolio and unmatched services. Elsewedy Electric always delivers top-rated products and services customers need with the best results they deserve. Our creative solutions help corporations and organizations to quickly adapt to new technologies that enhance business productivity and enable them to stay ahead of the competition.

At Elsewedy Electric, we focus on three pillars of sustainability: Human, Environment, and Technology. We are working to produce the best products and offer a wider selection of solutions in order to meet growing energy demands. We are striving to reduce our impact on the environment, conserve natural resources, and reducing our operating costs in the process.

Our heritage, as an energy solutions provider, runs deep. What began with Elsewedy Cables more than 30 years ago and became Elsewedy Electric has transformed into a global diversified company with more than 10,000 employees and 30 production facilities.

We are one of the top Energy Solutions companies in Middle East and Africa operating in 5 diversified energy segments; cables & accessories, electrical products, energy measurement & management, transformers, engineering & construction.

We are proud of what we have achieved so far but recognize that there is much work to be done to meet the aggressive goals we have set for ourselves. Elsewedy Electric has the capacity and the will to lead. We will continue to work & fight for those things that make the world a better place.

We remain dedicated to penetrate new markets with a vision of providing the best products and services to our clients and shareholders and create a good working environment for our employees. That's Performance with purpose. That's what every business owner should strive for.





ECMEI

In June 2008, Elsewedy Electric has acquired The Egyptian Company for Manufacturing Electrical insulators (ECMEI), the distinctive company in the middle East in manufacturing ceramics insulator.

ECMEI was established in 1994 with an annual production capacity of 7000 tons under license of CERAM group who have wide range of products and long standing experience in high tension insulators of different applications up to 210 KN in 765 KV Network.

We have also **ISO9001:2008** for Quality Management System, **ISO 14001:2004** for Environmental Management System, **OHSAS 18001:2007** for Occupational Health and Safety , **ISO/IEC 17025:2005** for High voltage testing lab.

ECMEI - as a part of Elsewedy Group - has embarked on a two-way strategic plan calling for vertical and horizontal integration.

Our Vision:

To be one of the pioneer companies in the field of manufacturing electrical insulators and provide related services world wide

Our Mission:

Manufacture different electrical insulators and supply to international markets as well as enhancing and developing our society.

Our Values:

- Mutual respect, Credibility, reliability, and integrity.
- Human resources are our dearest asset.
- Loyalty for our Customers.
- Innovation, creation, and continuous improvement.
- Working in a safe friendly environment.
- Quality is uncompromised

Porcelain Insulators



1- DISC INSULATORS:



Main Features:

1- ECMEI disc insulators contours ensure maximum Creepage path due to their distinctive geometrical configuration .Smooth rounded shell provides protection against chipping.

2- The glaze applied is compressive in nature which adds to mechanical strength and provides smooth surface for self cleaning under contamination. Standard glaze colours are Brown or Grey

3- Caps are made of malleable cast iron and pins are made of forged steel. These are galvanized to provide better protection against corrosion .Socket caps and pins are checked by specified gauges one and all to assure interchangeability . Socket portion suits R clip. The security clips are made of bronze or stainless steel as per customer's choice.

4- A fine resilient bitumen coating on side of the cap and surface of the ball pin as well as on sand band on the head and in the cavity in contact with cement, is applied to absorb stresses developed due to thermal expansion . It also protects metal part.

5- Application of Gravel on shell helps in uniform transfer of static and dynamic stresses by providing firm gripping surface for the cement which is used as filler between porcelain and metal part.

6- Rapid hardening Portland cement with special sand, and jigs equipped with vibrating arrangements, ensure proper distribution of bonding medium in assembly of metal part.

7- Insulators having alternative electro-mechanical ratings, spacing or Creepage distance to suit environmental conditions. Sacrificial collars of Zinc of 99.9 % purity to serve corrosion polluted areas can be provided as optional features.



Standards:

porcelain cap and pin insulator complies with the standard specifications of (IEC, IS, EN, ANSI)

Tests:

Tests are carried out on ECMEI cap and pin insulators in compliance with National, International standards or customer's standard.

(A) Routine test:

- Hydraulic proof load test on porcelain shells
- High frequency flash over test on porcelain shells
- Power frequency flash over test on porcelain shells
- Visual examination
- Routine mechanical test on assembled cap & pin insulators
- Power frequency flash over on assembled cap & pin insulators

(B) Sample test: Test samples are subjected to acceptance test in the order indicated below:

- Verification of locking system
- Verification of dimensions
- Temperature Cycle test
- Mechanical falling load test
- Electro-Mechanical falling load test
- Puncture test
- Porosity test
- Galvanizing test

(C) Type test:

- Visual examination
- Verification of dimensions
- Impulse voltage withstand test
- Wet power frequency withstand voltage
- Temperature Cycle test
- Electromechanical falling load test
- Under oil puncture test
- Mechanical falling load test

**(D) Additional tests for EHV insulator string:
(above 220kv)**

- Wet switching withstand test
- Radio interference voltage test mechanical strength of complete string
- Thermal mechanical performance test

(E) Special test to meet customer's requirements:

- Steep front wave flashover test with an effective rate of rise of 2500kv/us
- Power arc test of 10 kA (sym) RMS for 0.1 sec.
- Pollution test
- Autoclave test (for cement expansion)

Application Guide:

Suspension insulators (disc porcelain) are the most widely used models for transmission and distribution lines. In strings they can be used for any voltage depending on the number of units mounted in series.

Their design varies to suit different types of polluted zones and mechanical strength as per customer's requirements. It is possible to connect strings in parallel in sets of two or more to provide adequate mechanical strength for large spans or heavy conductors. Life expectancy of these insulators are extremely high but may be adversely affected if operated beyond specified limits of electrical or mechanical stress.

(a) choice of insulator profile

Normally three types of shell profile are available. The standard profile is used in temperate climate and reasonably clean areas. The anti fog type for the same insulator string length provides a longer leakage distance. Open profile insulators are meant to reduce accumulation of dust in desert area where rainfall is scarce, due to aerodynamic characteristics of insulator profile.

(b) Choice of string length for unpolluted areas

Standard profile is recommended, the string length is determined by the parameters of the system voltage and network.

For service voltage up to 220kv, the electrical criterion should be the dry impulse withstand/ flashover voltage of the insulator string which depends on the dry arcing distance of the complete strings set.

For service voltage above 220kv, the electrical criterion should be the wet switching surge withstand/flashover voltage. This depends on the length of the insulator string, the shape and position of string fittings and the location of the string with respect to the metal body of the tower.

(c) Choice of string lengths for polluted areas

The insulator string lengths with insulators subjected to polluted, wetted and max service voltage conditions are determined by its power frequency withstand voltage. According to severity of pollution, the performance of insulator string may reduce widely.

The wetting caused by fog, drizzle or sea spray, controls the severity of pollution. Heavy rain may remove the contaminants and thereby improve upon the performance of insulators strings.

The length of the insulator string can be calculated by using the recommended insulation level (mm/kv) for a certain profile and taking into account of the unit spacing of the selected insulators. Any increase in string length results in increase of height of tower with consequential higher line cost



Recommended profile of insulators and creep age paths for various categories of pollution zones are indicated in the following table:

CAP AND PIN INSULATORS

(recommended profile for polluted areas)

| Suspension strings (vertical) | | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|---------------------|
| Area | Normal | Anti-fog type profile | Open profile |
| coastal | Possible | Recommended | Possible |
| Desert | Possible | Recommended | Recommended |
| Industrial | Possible | Recommended | Recommended |
| Mixed | Not-advisable | Recommended | Recommended |
| Tension strings (horizontal) | | | |
| Area | Normal | Anti-fog type profile | Open profile |
| coastal | Possible | Recommended | Possible |
| Desert | Possible | Recommended | Recommended |
| Industrial | Possible | Recommended | Recommended |
| Mixed | Not-advisable | Recommended | Recommended |
| Table II (recommended creepage path) | | | |
| Pollution level | Typical environmental condition | Recommended creepage Distance mm/kv of highest System voltage | |
| Light | Agricultural areas, mountain areas, low density industrial/ housing areas but subject to frequent clean winds and rain falls. The above areas should be at least 20 km from sea and should not be exposed to direct sea breezy and dry weather. | 30-35 | |
| Medium | Industrial areas not producing any polluting smoke ,high density industrial/ housing areas with frequent winds and rain falls. Areas not close to sea. | 35-40 | |
| Heavy | Areas subject to severe industrial pollution; areas close to sea and exposed to sea winds. | 40-45 | |
| Very heavy | Areas subject to conductive dust, industrial smoke producing conductive deposits, desert areas with terrain close to coast and exposed to sea spray and polluting sea wind. | 45-55 | |
| Notes | | | |
| <ul style="list-style-type: none"> • Creepage distance mm/kv correspond to highest system voltage in kv (phase to phase) • In areas with no significant pollution a creepage distance not lower than 16 mm/kv may be considered • Creepage distance higher than 45 mm/kv in case of exceptionally high polluted areas, may not be a solution. RTV coating, periodical cleaning and live line washing are recommended in such cases. | | | |

(d) string length at strain points

Dead end or large angle structures are often located where safety is important such as at road or rail road crossings or where other utilities are crossed.

Mechanical or electrical failures can least be afforded at these points. Since electrical troubles are followed by mechanical troubles, longer strings are recommended in strain points than at regular suspension points.

Flashover values, both power frequency dry or impulse for insulator strings in the strain position are less than those for the same string length in the vertical position, as the sagging of horizontal strings reduces the arcing distance. Further reduction of approximately 8 to 10% in power frequency dry and impulse flashover values of strings in horizontal position is expected due to distortion of electrostatic field at the line end of strain strings where change in direction is involved. As drip water does not accumulate on horizontal string unlike on vertical string, the wet flashover value of a horizontal string is only slightly lower than its power frequency dry flashover value.

(e) choice of M & E rating

Generally loads applied to the insulator on an operating line are calculated by taking into account the weight of conductors and wind velocity under everyday load condition, on the most loaded section of the line conventional safety factor is thereafter to be applied for determining the minimum M & E rating of the insulators.

ECMEI suspension disc insulators can be loaded permanently at 40% of the catalogue rating taking advantage of their high reliability and insensitiveness to continuous and changing mechanical, electrical and thermal influences. The maximum load should not however exceed 65% of the rated M & E strength.

(f) corrosion

For polluted areas use of pins protected by a sacrificial zinc sleeve fused around the pin at air cement interface is recommended. The zinc sleeve does not take part in the mechanical structure of the insulator and its gradual elimination does not affect the mechanical characteristics of the whole complex.

(g) General guide for Ball & Socket coupling standards for designing insulator strings

| IEC standard | |
|----------------------------|---------------------------------|
| Minimum failing load in KN | Standard (ball& socket size) mm |
| 70 | 16 |
| 80 | 16 |
| 90 | 16 |
| 120 | 16 |
| 120 | 20 |
| 160 | 20 |
| 210 | 20 |



(h) Correction for Altitude and Ambient temperature

The flashover voltage of String insulators decreases due to lower atmospheric pressure in high altitude or due to exposure of - insulators to tropical climates having temperature above 40°C. At altitudes of over 1000 M above sea level or in places with temperature over 40°C, it is recommended that the flashover voltage value at Normal condition is multiplied by the following factor and the number of insulators is increased to meet the requirement.

$$\text{Correction factor for } t^{\circ}\text{C Service temperature} = \frac{273 + t^{\circ}}{313}$$

$$\text{Correction factor H meters of Altitude above sea level} = 1 + 0.1 \frac{(H - 1000)}{100}$$

(*)Power arcs

Short circuit currents of high magnitude may cause melting of the insulator pins. It is therefore, necessary to have the protection fittings in an insulator string carefully designed. It may noted that short circuit currents of 20000 and 30000 amps. of one second duration cause melting of steel bars of 16 mm and 20 mm diameter respectively.



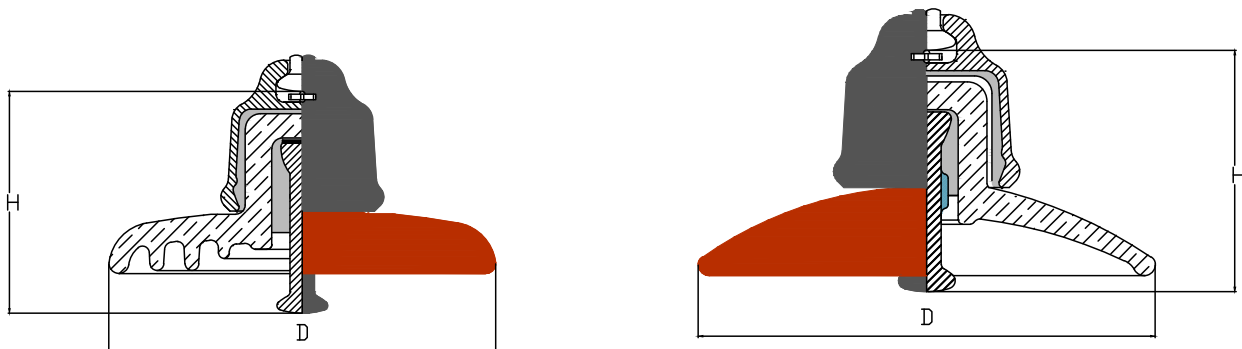
SPECIFICATIONS:

A- Normal Disc & Open Profile types

Cap and pin insulators are generally used on over head transmission and distribution network to evacuate bulk power over long distances. The insulators could be in suspension or tension made in string form to insulate the conductor from tower. We manufacture Normal Profile type up to 120 KN electro-mechanical strength and up to 320 mm leakage path. Open profile type is up to 120 KN electro-mechanical strength and 350 mm leakage path. The Open profile's pin includes zinc sleeve; and for normal Profile's pin excludes zinc sleeve unless if required. Every insulator is tested with hydraulic pressure and combination of high and power frequency electrical test; followed by routine mechanical and electrical test as per IEC standard after assembling with cement and metal parts.

| STANDARD PARTICULARS | | | | | | | | | | |
|--------------------------------------|----------------------------|-------------|--------|--------|--------|--------|--------|--------|--------|-----|
| Product No. | | | 040-00 | 044-00 | 044-01 | 044-02 | 044-06 | 053-00 | 053-01 | |
| Porcelain Dia.(D) | | mm | 175 | 255 | 255 | 255 | 255 | 330 | 320 | |
| Spacing (H) | | mm | 110 | 146 | 146 | 146 | 146 | 146 | 146 | |
| Creepage Distance | Total Creepage | mm | 190 | 320 | 320 | 320 | 320 | 295 | 350 | |
| | Protected Creepage | mm | 100 | 165 | 165 | 165 | 165 | 150 | 250 | |
| Combined Electro Mechanical Strength | | | KN | 40 | 90 | 100 | 70 | 120 | 80 | 120 |
| Flashover voltage | Power Frequency | Dry KV | 55 | 75 | 75 | 75 | 75 | 75 | 75 | |
| | | Wet KV | 37 | 45 | 45 | 45 | 45 | 45 | 50 | |
| | Impulse | Positive KV | 75 | 115 | 115 | 115 | 115 | 115 | 115 | |
| | | Negative KV | 80 | 120 | 120 | 120 | 120 | 115 | 115 | |
| Withstand Voltage | one minute power frequency | Dry KV | 50 | 70 | 70 | 70 | 70 | 70 | 70 | |
| | | Wet KV | 33 | 40 | 40 | 40 | 40 | 40 | 45 | |
| | Impulse | Positive KV | 70 | 110 | 110 | 110 | 110 | 110 | 110 | |
| | | Negative KV | 75 | 115 | 115 | 115 | 115 | 110 | 110 | |
| Visible Discharge Voltage | | KV | 9 | 9 | 9 | 9 | 9 | 9 | 9 | |
| Power frequency Puncture Voltage | | KV | 90 | 110 | 110 | 110 | 110 | 125 | 130 | |
| Ball Socket Size | | mm | 11 | 16 | 16 | 16 | 16 | 16 | 16 | |
| Net Weight (Approx.) | | kg | 2.5 | 5 | 5 | 5 | 5 | 5.5 | 6 | |

* We have the ability to fulfill client requirements within international standards



Normal Type

Open Profile Type

B- Anti Fog Profile

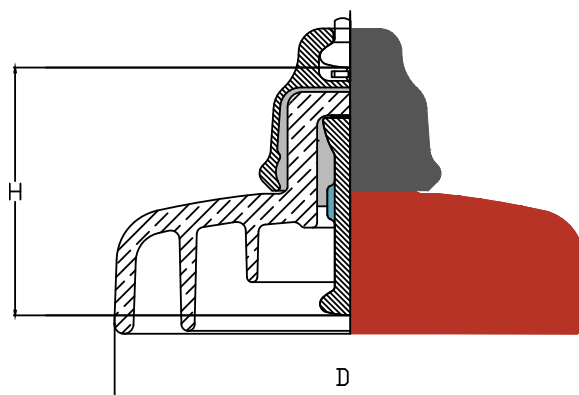
Cap and pin insulators are generally used on over head transmission and distribution network to evacuate bulk power over long distances. The insulators could be in suspension or tension made in string form to insulate the conductor from tower.

We manufacture Anti-fog type to 210 KN electro-mechanical strength insulators and up to 555 mm leakage path for networks up to 500 KV. In a straight head design, the insulator pin includes zinc sleeve.

Every insulator is tested with hydraulic pressure and combination of high and power frequency electrical test; followed by routine mechanical and electrical test as per IEC standard after assembling with cement and metal parts.

| STANDARD PARTICULARS | | | | | | | | | | | | | |
|--------------------------------------|----------------------------|----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-----|
| Product No. | | | 041-00 | 043-00 | 045-00 | 045-01 | 045-02 | 046-00 | 046-01 | 050-00 | 050-02 | 052-00 | |
| Porcelain Dia.(D) | | mm | 255 | 280 | 280 | 280 | 280 | 320 | 320 | 320 | 320 | 320 | |
| Spacing (H) | | mm | 110 | 146 | 170 | 146 | 146 | 146 | 146 | 175 | 175 | 175 | |
| Creepage Distance | Total Creep age | mm | 320 | 450 | 450 | 450 | 450 | 465 | 465 | 555 | 555 | 555 | |
| | Protected Creep age | mm | 220 | 320 | 320 | 320 | 320 | 320 | 320 | 400 | 400 | 400 | |
| Combined electro-mechanical strength | | KN | 40 | 90 | 120 | 120 | 120 | 90 | 120 | 160 | 120 | 210 | |
| Flashover Voltage | Power Frequency | Dry | KV | 78 | 80 | 80 | 80 | 80 | 85 | 85 | 95 | 80 | 95 |
| | | Wet | KV | 45 | 48 | 45 | 45 | 45 | 55 | 55 | 60 | 45 | 60 |
| | Impulse | Positive | KV | 120 | 125 | 125 | 125 | 125 | 145 | 145 | 150 | 125 | 150 |
| | | Negative | KV | 125 | 130 | 130 | 130 | 130 | 150 | 150 | 155 | 130 | 155 |
| Withstand Voltage | one minute power frequency | Dry | KV | 70 | 75 | 70 | 70 | 70 | 80 | 80 | 90 | 70 | 90 |
| | | Wet | KV | 40 | 42 | 40 | 40 | 40 | 45 | 45 | 50 | 40 | 50 |
| | Impulse | Positive | KV | 115 | 120 | 120 | 120 | 120 | 135 | 135 | 140 | 120 | 140 |
| | | Negative | KV | 120 | 120 | 125 | 125 | 125 | 140 | 140 | 150 | 125 | 150 |
| Visible Discharge Voltage | | KV | 9 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | |
| Power frequency Puncture Voltage | | KV | 110 | 130 | 130 | 130 | 130 | 140 | 140 | 140 | 130 | 140 | |
| Ball Socket Size | | mm | 11 | 16 | 20 | 20 | 16 | 16 | 16 | 20 | 20 | 20 | |
| Net Weight (Approx.) | | kg | 3.7 | 8 | 8.5 | 8.5 | 8.5 | 9 | 9 | 11 | 11 | 11.25 | |

* We have the ability to fulfill client requirements within international standards



Anti-Fog Type

2- SOLID CORE LINE POST INSULATOR:**Main Features:**

ECMEI Solid core line post insulators conforms to specifications of IEC 383 and ANSI-C29.7.

1-ECMEI product range includes line post with clamp top and stud base for both horizontal and vertical mounting .Conductor groove type line posts are supplied with short stud or long stud as required.

2- ECMEI insulators are made from highest quality wet process porcelain having excellent electrical and mechanical characteristics. Metal parts are made of malleable iron or steel both galvanized as per ASTM specifications .Cementing operations are carried out under rigidly controlled conditions.

3- ECMEI insulators have stream-lined feature with symmetrical upper and lower electrodes which prevent accumulation of salt and dust and therefore have an excellent antipollution performance.

4- These insulators have high arc resistibility similar to solid core long rod insulators. There will be little decrease in flashover voltage if a shed get damaged .Sufficient distance between electrodes makes these insulators puncture proof.

5- Owing to comparatively longer distance between upper and lower electrodes , the RIV is extremely low.

6- Insulators are normally brown glazed or light grey.

Tests:

The following tests are carried out on ECMEI solid core line post insulators in compliance with national and international standards:

Routine test:

- Visual examination
- Routine mechanical test

Sample test:

- Verification of dimensions
- Temperature Cycle test
- Mechanical falling load test (Cantilever)
- Galvanizing test
- Porosity test

Type test:

- Visual examination
- Verification of dimensions
- Impulse voltage withstand test
- Wet / Dry power frequency withstand voltage
- Mechanical falling load test (cantilever)

**Application Guide:**

ECMEI solid core line post insulators up to 33 kv can be used for construction of overhead lines at a cheaper cost but having the reliability of a line using suspension long rod insulator. To supplement the deficiencies of pin insulators ,Solid core line post insulators based on long-rod concept are recommended for distribution lines up to 33 kv .Further line construction cost using solid core line post insulator is cheaper compared with that using long rod insulators for suspension .These insulators can be used as support for conductors on cross-arms of transmission and distribution line poles.

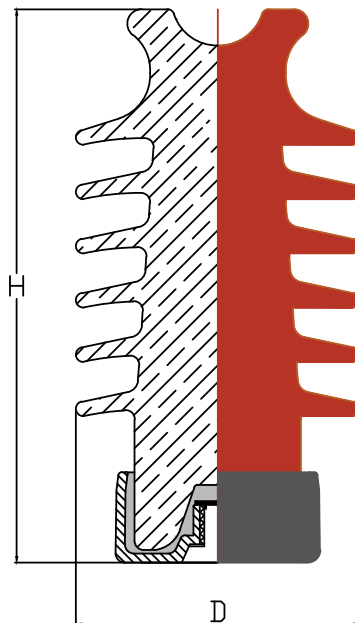
SPECIFICATIONS:

Line Post Insulator

Line post insulators are applied on medium voltage overhead distribution lines up to (36KV) for fixing conductors to tower bodies and used in the distribution systems of the town. We manufacture these insulators with leakage path from 356 mm up to 1660 m with mechanical strength up to 12.5 KN.

| STANDARD PARTICULARS | | | | | | | | | |
|--------------------------------|----------------------------|----------|--------|--------|--------|--------|--------|--------|-----|
| Product No. | | | 090-00 | 090-01 | 090-02 | 090-03 | 090-04 | 090-07 | |
| Recommended voltage | KV | | 24 | 15 | 36 | 36 | 36 | 36 | |
| Insulator length (H) | mm | | 305 | 230 | 510 | 368 | 381 | 506 | |
| Insulator biggest diameter (D) | mm | | 152 | 145 | 185 | 178 | 165 | 232 | |
| Creepage distance | mm | | 560 | 356 | 1320 | 825 | 737 | 1660 | |
| Dry arcing distance | mm | | 228 | 166 | 450 | 310 | 312 | 500 | |
| Stud size | mm | | 20 | 20 | 20 | 20 | 20 | 20 | |
| Cantilever strength | KN | | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 | |
| Flashover Voltage | Power Frequency | Dry | KV | 110 | 80 | 175 | 125 | 125 | 155 |
| | | Wet | KV | 85 | 60 | 150 | 100 | 100 | 135 |
| | Impulse | Positive | KV | 180 | 130 | 290 | 210 | 210 | 300 |
| | | Negative | KV | 205 | 155 | 350 | 260 | 260 | 350 |
| Withstand Voltage | one minute power frequency | Dry | KV | 90 | 70 | 160 | 100 | 100 | 150 |
| | | Wet | KV | 65 | 53 | 135 | 93 | 93 | 130 |
| | Impulse | Positive | KV | 150 | 110 | 250 | 170 | 170 | 270 |
| | | Negative | KV | 150 | 110 | 250 | 170 | 170 | 270 |
| Net Weight (Approx.) | kg | | 7.5 | 4.5 | 21 | 10 | 10 | 22 | |

* We have the ability to fulfill client requirements within international standards



Line Post Insulator

3- PIN INSULATOR:**Main Features:**

1- ECMEI pin insulators are made of high grade wet process and normally brown glazed.

2- Pin insulators of ECMEI are one piece manufactured. One type of threads is normally provided, a non –ferrous metal insert is cemented inside the pin hole .Metal insert (thimble) is made of lead or Zinc.

3- Height of the pins used shall be suitable to provide maximum dry arc distance. Pin insulator with special head grooves to accommodate special conductors can be supplied on request.

Standards:

Pin insulators conforms to specifications of IEC 383

Tests:

The following tests are carried out on ECMEI pin insulators in compliance with national and international standards:

(A) Routine test:

- Routine electrical test
- Routine visual examination

(B) Sample test:

- Verification of dimensions
- Temperature Cycle test
- Mechanical falling load test (Cantilever)
- Puncture test
- Porosity test
- Galvanizing test

(C) Type test:

- Visual examination
- Verification of dimensions
- Impulse voltage withstand test
- Wet power frequency withstand voltage
- Temperature Cycle test
- Mechanical falling load test (cantilever)
- Under oil puncture test

(D) Additional test

- Dry power frequency flashover test
- Wet power frequency flashover test
- Artificial pollution test.

**Application Guide:**

- Pin insulators of one piece construction are widely used in low cost distribution lines. ECMEI manufactures full range of pin insulators for application in sub-transmission and distribution lines up to system voltage 33 Kv .
- These insulators are available with creepage distance to meet different requirements of pollution up to 45mm/Kv



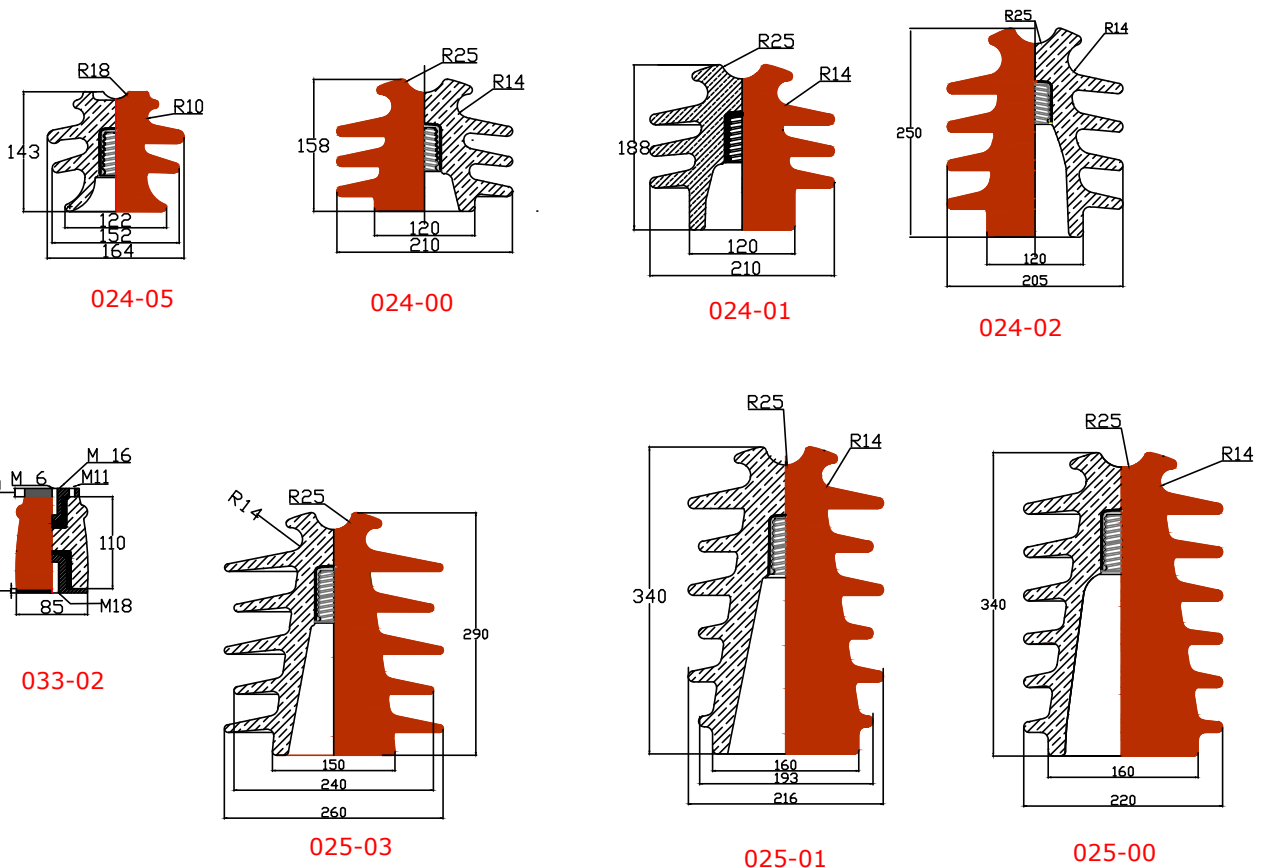
SPECIFICATIONS:

Pin Insulator

Pin insulators are used on medium voltage over head distribution lines (15, 25 and 36 KV) for fixing conductors to tower bodies to distribute power from substation to town and inside the town networks. The insulators are manufactured with leakage path from 330 mm up to 990 mm and 10 KN bending strength or subject to client requirements.

| STANDARD PARTICULARS | | | | | | | | | | | |
|----------------------------------|----------------------------|----------|--------|--------|--------|--------|--------|--------|--------|--------|----|
| Product No. | | | 024-00 | 024-01 | 024-02 | 024-05 | 025-00 | 025-01 | 025-03 | 033-02 | |
| Highest System voltage | | KV | 15 | 15 | 36 | 15 | 36 | 36 | 36 | 11 | |
| Total creepage distance | | mm | 440 | 535 | 686 | 330 | 990 | 990 | 990 | 115 | |
| Cantilever strength | | KN | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 4 | |
| Flashover Voltage | Power Frequency | Dry | KV | 85 | 100 | 110 | 45 | 120 | 105 | 120 | 44 |
| | | Wet | KV | 45 | 50 | 60 | 40 | 100 | 85 | 100 | 25 |
| | Impulse | Positive | KV | 125 | 125 | 140 | 85 | 175 | 120 | 175 | 85 |
| | | Negative | KV | 130 | 130 | 140 | 90 | 175 | 120 | 175 | 90 |
| Withstand Voltage | one minute power frequency | Dry | KV | 80 | 90 | 100 | 40 | 110 | 96 | 110 | 28 |
| | | Wet | KV | 40 | 45 | 55 | 35 | 90 | 80 | 90 | 20 |
| | Impulse | Positive | KV | 120 | 120 | 130 | 75 | 170 | 125 | 170 | 75 |
| | | Negative | KV | 120 | 120 | 130 | 75 | 170 | 125 | 170 | 75 |
| Power frequency Puncture Voltage | | KV | 135 | 135 | 150 | 95 | 180 | 180 | 180 | NA | |
| Net Weight (Approx.) | | kg | 5.4 | 5.5 | 7 | 2.7 | 12.5 | 12 | 11 | 1 | |

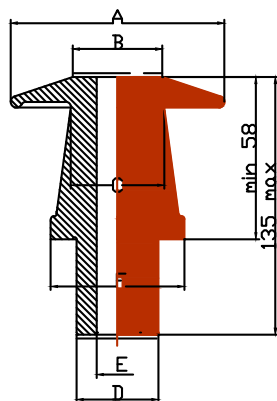
* cantilever strength is subject to the required spindle



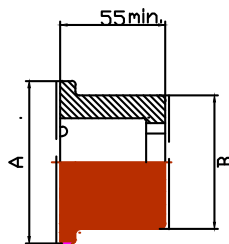
4- A- LOW VOLTAGE DISTRIBUTION TRANSFORMER BUSHING

We manufacture low voltage distribution transformer bushings with leakage path up to 100 mm which support the low voltage side of the transformer to carry the output cables up to 3150A .

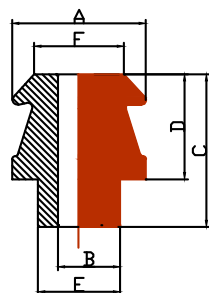
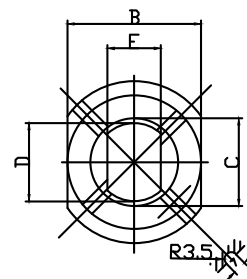
| STANDARD PARTICULARS | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------------------|--------|---------|------|---------|-----|----------|-----|----------|------|----------|-----|---------|-----|---------|-----|----------|-----|----------|-----|----------|-----|-----|
| Product No. | | 003-00 | | 006-00 | | 005-00 | | 004-00 | | 001-00 | | 011-00 | | 010-00 | | 009-00 | | 008-00 | | 007-00 | | |
| Transformer rating KV/Amp | | 1KV/250 | | 1KV/630 | | 1KV/1000 | | 1KV/2000 | | 1KV/3150 | | 1KV/250 | | 1KV/630 | | 1KV/1000 | | 1KV/2000 | | 1KV/3150 | | |
| | | Amp | | Amp | | Amp | | Amp | | Amp | | Amp | | Amp | | Amp | | Amp | | Amp | | |
| Part | | I | II | I | II | I | II | I | II | I | II | I | II | I | II | I | II | I | II | I | II | |
| Dimensions | A | mm | 75 | 70 | 90 | 85 | 110 | 110 | 125 | 125 | 145 | 150 | 50 | 60 | 70 | 85 | 70 | 110 | 104 | 125 | 125 | 150 |
| | B | mm | 32 | 60 | 47 | 70 | 65 | 90 | 80 | 105 | 100 | 125 | 14 | 20 | 22 | 28 | 32 | 37 | 44 | 51 | 50 | 61 |
| | C | mm | 30 | 40 | 45 | 46 | 65 | 57 | 80 | 70 | 100 | 90 | 70 | 30 | 80 | 30 | 85 | 36 | 85 | 35 | 85 | 35 |
| | D | mm | 37 | 26 | 43 | 41 | 53 | 46 | 66 | 64 | 86 | 80 | 45 | 50 | 55 | 70 | 55 | 90 | 55 | 104 | 55 | 125 |
| | E | mm | 14 | 20 | 22 | 28 | 32 | 37 | 44 | 51 | 50 | 61 | 27 | 26 | 53 | 41 | 53 | 46 | 66 | 64 | 86 | 80 |
| | F | mm | 60 | --- | 70 | --- | 90 | --- | 105 | --- | 125 | --- | 32 | 30 | 47 | 46 | 65 | 57 | 80 | 71 | 100 | 90 |
| Power Frequency Withstand Voltage | Dry KV | | 25 | | 25 | | 25 | | 25 | | 25 | | 25 | | 25 | | 25 | | 25 | | 25 | |
| | Wet KV | | 21 | | 21 | | 21 | | 21 | | 21 | | 10 | | 10 | | 10 | | 10 | | 10 | |
| Impulse withstand voltage KV | | | 45 | | 45 | | 45 | | 45 | | 45 | | 45 | | 45 | | 45 | | 45 | | 45 | |
| Net Weight (Approx.) kg | | 0.43 | 0.12 | 0.8 | 0.4 | 1.1 | 0.7 | 1.4 | 0.75 | 1.5 | 0.9 | 0.2 | 0.1 | 0.4 | 0.2 | 0.7 | 0.5 | 0.9 | 0.6 | 1.5 | 0.8 | |



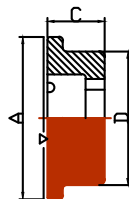
(Upper Insulator)
I



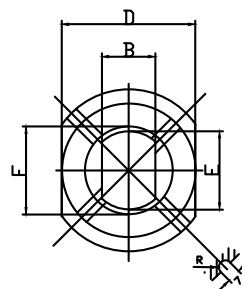
(Lower Insulator)
II



(Upper Insulator)
I



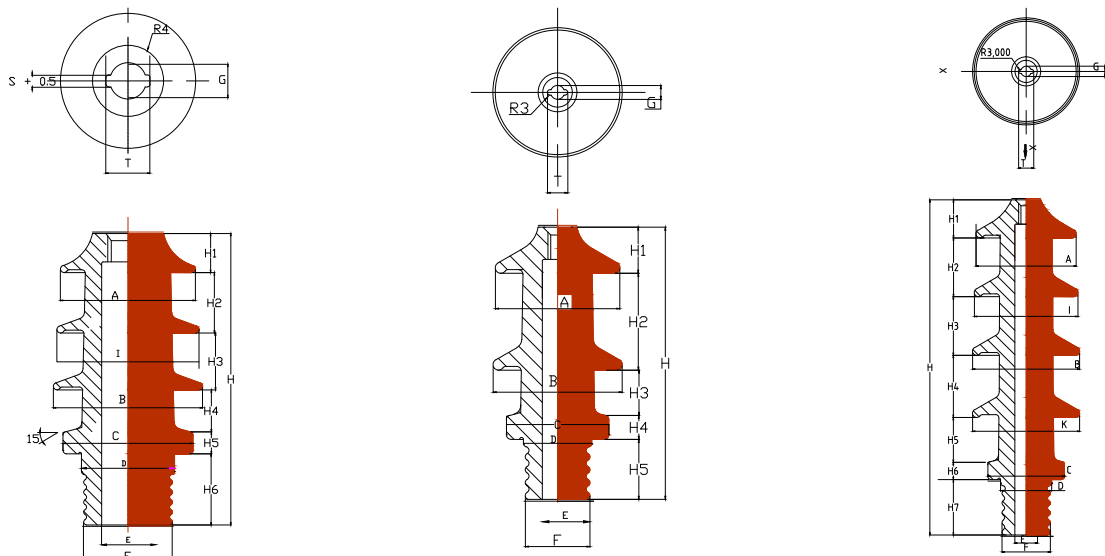
(Lower Insulator)
II



4- B- MEDIUM VOLTAGE DISTRIBUTION TRANSFORMER BUSHING

Transformer bushing for outdoor and indoor are used as structure carrying on conductor through a partition from the transformer tank.

| STANDARD PARTICULARS | | | | | | | | | | |
|-------------------------------------------------|------------|----------|----------|----------|----------|-----------|----------|----------|----------|--------|
| Product No. | | | 016-00 | 015-00 | 014-00 | 013-00 | 012-00 | 019-00 | 018-00 | 017-00 |
| Transformer rating | KV/Amp | 20NF/250 | 20NF/630 | 30NF/250 | 30NF/630 | 20NF/3150 | 10NI/250 | 10NF/250 | 10NF/630 | |
| | | Amp | Amp | Amp | Amp | Amp | Amp | Amp | Amp | |
| Dimensions | Dia. A | mm | 145 | 155 | 145 | 165 | 190 | 95 | 135 | 145 |
| | Dia. B | mm | 155 | 165 | 155 | 175 | 210 | 100 | 140 | 150 |
| | Dia. I | mm | 150 | 160 | 150 | 170 | 200 | 111 | 111 | 128 |
| | Dia. K | mm | --- | --- | 155 | 160 | --- | 74 | 74 | 88 |
| | Dia. C Max | mm | 111 | 128 | 111 | 128 | 187 | 33 | 33 | 39 |
| | Dia. D Max | mm | 74 | 88 | 74 | 88 | 130 | 70 | 70 | 85 |
| | Dia E Min | mm | 33 | 39 | 33 | 39 | 74 | 33 | 33 | 39 |
| | Dia F | mm | 70 | 85 | 70 | 85 | 125 | 70 | 70 | 85 |
| | Dia G | mm | 15±1 | 24.5±1 | 15±1 | 24.5±1 | 17±0.5 | 15±1 | 15±1 | 24.5±1 |
| | T | mm | 22±1 | 30.5±1 | 22±1 | 30.5±1 | 62±0.5 | 22±1 | 22±1 | 30.5±1 |
| | H | mm | 385 | 385 | 485 | 510 | 410 | 245 | 295 | 295 |
| | H1 | mm | 55 | 55 | 55 | 60 | 55 | 35 | 50 | 50 |
| | H2 | mm | 85 | 85 | 85 | 80 | 85 | 245 | 295 | 295 |
| | H3 | mm | 90 | 90 | 85 | 85 | 80 | 35 | 50 | 50 |
| H4 | mm | 50 | 50 | 90 | 90 | 60 | 75 | 105 | 105 | |
| H5 | mm | 25 | 25 | 65 | 70 | 30 | 45 | 50 | 70 | |
| H6 | mm | 80 | 80 | 25 | 25 | 100 | 25 | 25 | 25 | |
| H7 | mm | --- | --- | 80 | 100 | --- | 65 | 65 | 65 | |
| Visible Discharge Voltage | | KV/Amp | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Power Frequency one minute withstand voltage | Dry | KV | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 |
| | Wet | KV | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 |
| Impulse withstand voltage | | KV | 95 | 95 | 95 | 95 | 95 | 95 | 95 | 95 |
| Net Weight (Approx.) | | kg | 5.9 | 6.8 | 7.6 | 9.6 | 6 | 2.7 | 3.8 | 4.9 |

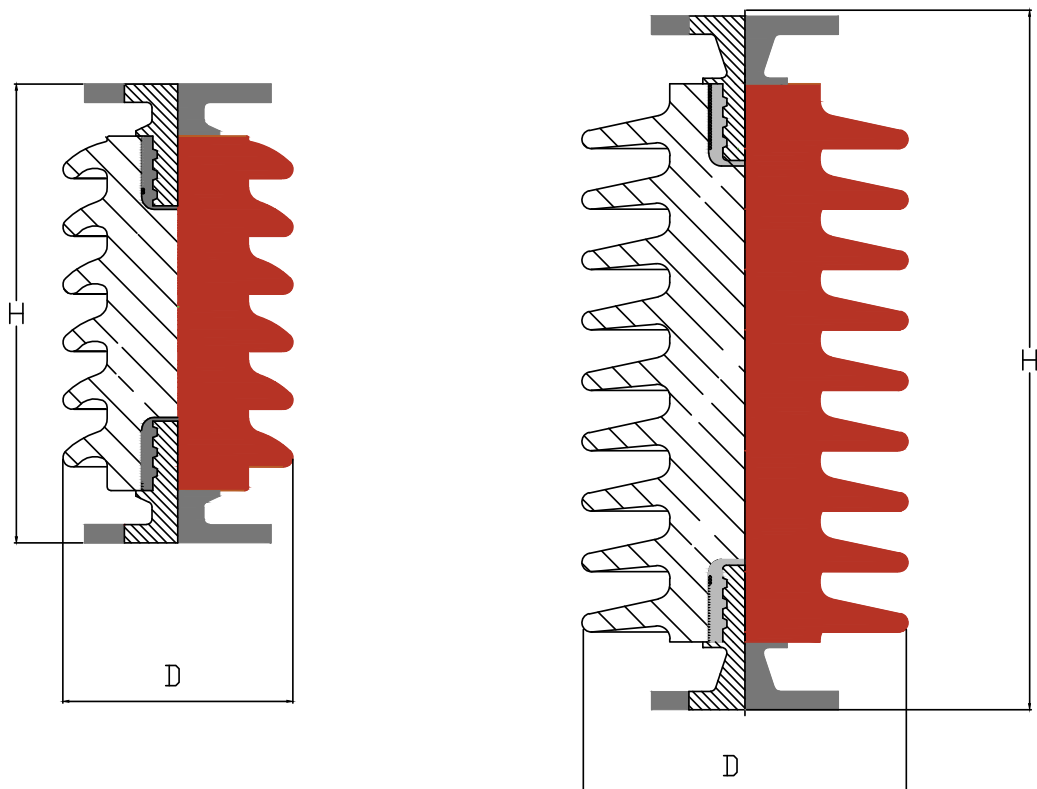


1 PORCELAIN INSULATORS

5- POST INSULATOR

Post insulators are used in medium voltage 12, 25 KV with leakage path 440mm up to 1047 mm, with mechanical strength up to 4 KN and also for 66 KV with leakage path 2450mm. It can be used for indoor and outdoor applications.

| STANDARD PARTICULARS | | | | | | | | | |
|--------------------------|----------------------------|---------|--------|--------|--------|--------|--------|--------|-----|
| Product No. | | | 029-00 | 029-01 | 029-03 | 030-00 | 030-01 | 030-02 | |
| Type | | | P70 | P70s | P70 | P13s | --- | --- | |
| Rated Insulation voltage | | KV | 25 | 25 | 25 | 36 | 72.5 | 36 | |
| Total creepage distance | | mm | 440 | 500 | 550 | 1047 | 2450 | 1200 | |
| Height (H) | | mm | 250.5 | 257 | 280 | 380 | 902 | 460 | |
| Biggest Diameter | | mm | 127 | 131 | 136 | 180 | 180 | 180 | |
| Bending falling load | | KN | 4 | 4 | 4 | 2.3 | 2.3 | 2.3 | |
| Number of sheds | | Nos. | 6 | 6 | 6 | 9 | 20 | 10 | |
| Arcing Distance | | mm | 193 | 193 | 194 | 305 | 820 | 385 | |
| Withstand Voltage | one minute power frequency | Wet | KV | 50 | 50 | 50 | 50 | 185 | 80 |
| | | Impulse | KV | 130 | 130 | 130 | 150 | 410 | 200 |
| Net Weight (Approx.) | | kg | 4.5 | 4.5 | 5 | 11 | 25 | 13.5 | |



P70
029-00

P13
030-00

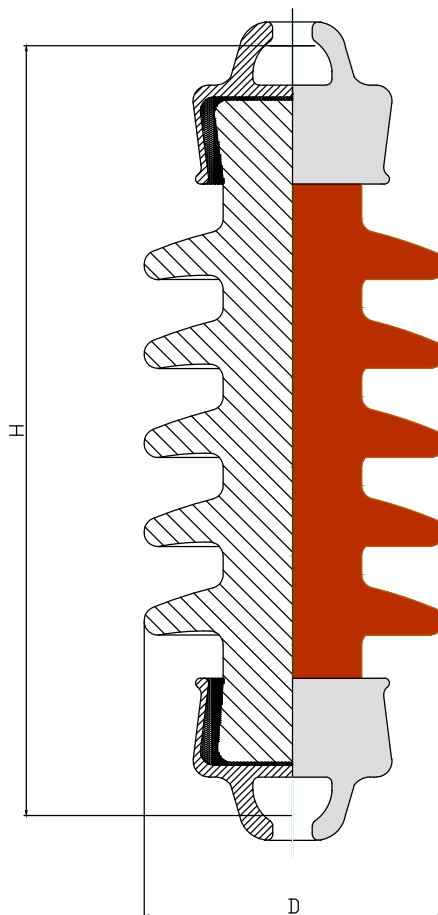
6- LONG ROD INSULATOR

Long rod insulators are applied on medium and high over head distribution and transmission lines for suspension or tension of conductor to tower bodies.

We produce long insulator with ball and socket coupling-Long rod insulators are absolutely puncture-proof and have excellent anti-pollution performance.

Long rod insulators are made with ceramic materials and it can be manufactured with other voltage levels and higher leakage path as per customer's request.

| STANDARD PARTICULARS | | | | | | | | | | | | |
|---------------------------------------|-----------------|--------|--------------|---------------|---------------|---------------|---------------|----------------|----------------|----------------|----------------|--------|
| Product No. | | | 037-00 | 037-02 | 037-03 | 037-04 | 037-05 | 037-06 | 037-07 | 037-08 | 037-09 | 037-10 |
| Type of insulator according to IEC433 | | | L 90E 240 | L 70 E 175 | L 70 E 245 | L 70 E 310 | L 70 E 380 | L 100 E 380 | L 100 E 411 | L 100 E 550 | L 120 E 550 | ---- |
| Insulator length (H) | mm | | 390 | 340 | 410 | 460 | 550 | 580 | 611 | 895 | 915 | 847 |
| Insulator diameter (D) | mm | | 150 | 180 | 180 | 180 | 180 | 190 | 150 | 190 | 200 | 185 |
| Creepage distance | mm | | 550 | 400 | 500 | 650 | 800 | 800 | 1000 | 1200 | 1200 | 1800 |
| Type of coupling | mm | | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 20 |
| Mechanical breaking load | KN | | 90 | 70 | 70 | 70 | 70 | 100 | 100 | 100 | 120 | 160 |
| Withstand Voltage | Power frequency | Wet KV | 70 | 50 | 70 | 85 | 95 | 95 | 70 | 140 | 140 | 200 |
| | Impulse | Dry KV | 170 | 125 | 170 | 200 | 250 | 250 | 170 | 325 | 325 | 400 |
| Net Weight (Approx.) | kg | | 9 | 7 | 8 | 9.5 | 12 | 12.2 | 13.5 | 13.5 | 14 | 20 |



1 PORCELAIN INSULATORS

7- STAY INSULATOR

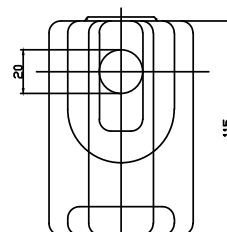
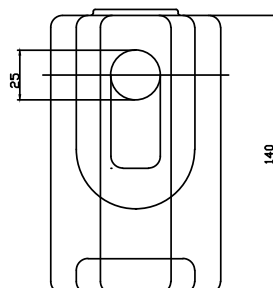
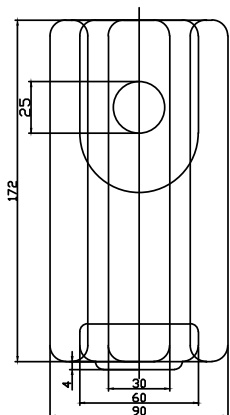
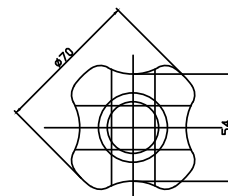
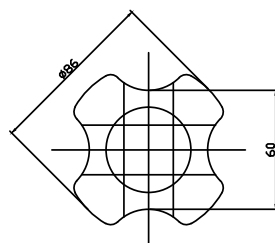
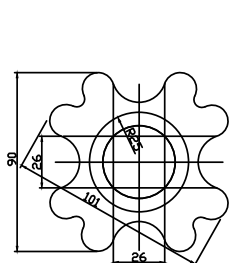
Stay insulators give protection in case of accidentally broken live wire that can accidentally energize a stay wire and remains in contact with line which doesn't trip. In some cases the bottom portion of the stay would have no voltage due to insulation, stay insulator will normally be installed in the middle of stay wire.

Three types of stay insulators are generally used for rural and railway:

- 1.1 KV stay
- 15 KV stay
- 36 KV stay



| STANDARD PARTICULARS | | | | | | |
|----------------------|-----------------|-----|--------|--------|--------|----|
| Product No. | | | 080-00 | 080-01 | 080-02 | |
| Highest voltage | | KV | 36 | 1.1 | 15 | |
| Creepage distance | | mm | 76 | 48 | 57 | |
| Tensile strength | | KN | 89 | 53 | 80 | |
| Withstand Voltage | Power frequency | Dry | KV | 40 | 30 | 35 |
| | | Wet | KV | 23 | 15 | 18 |
| Net Weight (Approx.) | | kg | 1.9 | 0.7 | 1.5 | |



080-00

080-02

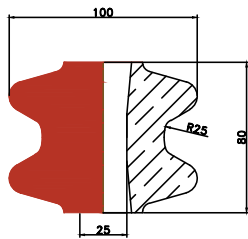
080-01

8- LOW VOLTAGE SPOOL & SHACKLE INSULATOR

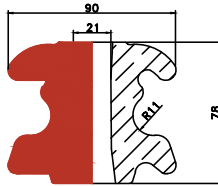
These insulators are applied on low voltage over head distribution lines for fixing of conductors to poles.

This group of our manufacturing range includes low voltage insulators (Shackle, Spool) standardized in accordance with DIN and ANSI standard application.

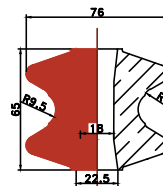
| STANDARD PARTICULARS | | | | | | | | | | |
|----------------------|-----------------|-----|--------|--------|--------|--------|--------|--------|--------|----|
| Product No. | | | 039-00 | 039-01 | 039-02 | 055-01 | 076-00 | 076-01 | 076-03 | |
| Creepage distance | | mm | 65 | 66 | 60 | 60 | 60 | 57 | 57 | |
| Mechanical strength | | KN | 8 | 8 | 6 | 8 | 12 | 12 | 12 | |
| Withstand Voltage | Power frequency | Dry | KV | 22 | 23 | 22 | 20 | 18 | 18 | 20 |
| | | Wet | KV | 9 | 10 | 8.5 | 9 | 6 | 6 | 8 |
| Net Weight (Approx.) | | kg | 0.55 | 0.6 | 0.5 | 0.3 | 0.5 | 0.4 | 0.5 | |



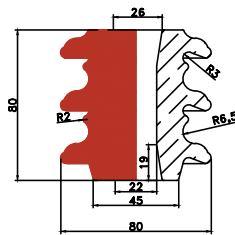
039-00



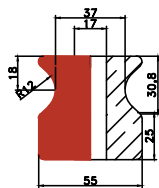
039-01



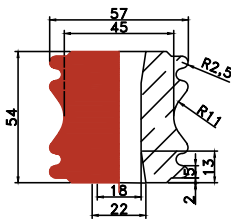
039-02



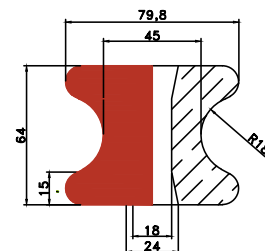
055-01



076-00



076-01



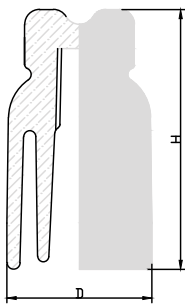
076-03

9- LOW VOLTAGE PIN INSULATOR

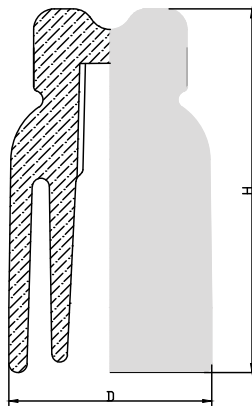
These insulators are fitted on low voltage over head lines (1.1KV) for fixing of conductor to poles and in the distribution system of the town with leakage path 150 mm up to 280 mm and with bending load 8KN to 18 KN.



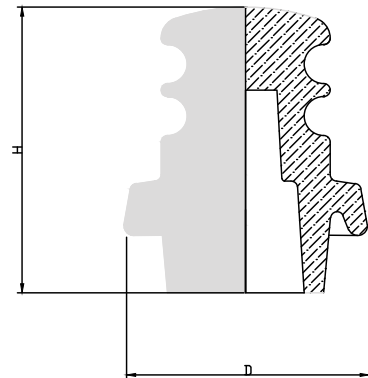
| STANDARD PARTICULARS | | | | |
|-----------------------------------|--------|-----|--------|--------|
| Product No. | RMI | | RM II | 055-00 |
| | 026-01 | | 027-01 | |
| Creepage distance | mm | 280 | 175 | 150 |
| Biggest diameter (D) | mm | 86 | 71 | 93 |
| Height (H) | mm | 140 | 100 | 110 |
| Bending failing load | KN | 10 | 8 | 18 |
| Power frequency Withstand Voltage | Dry | KV | 40 | 20 |
| | Wet | KV | 30 | 10 |
| Lightning Impulse voltage | KV | 75 | 55 | 40 |
| Puncture voltage in oil | KV | 70 | 50 | 35 |
| Net Weight (Approx.) | kg | 1 | 0.5 | 0.7 |



027-01
RMII



026-01
RMI



055-00



Porcelain Insulators



**Elsewedy
Polymer**



INTRODUCTION



ECMEI

The Egyptian Company for Manufacturing Electrical Insulators (ECMEI) is one of few companies who can offer both porcelain and polymer electrical insulators products. Our insulators are the result of more than 20 years of research and development.

ISO certification 9001, 14001, 18001 and special one **ISO 17025** has been achieved due to our wide engineering special knowledge and shared experience with our esteemed customers.

High performance and quality of our polymer insulators have been proven by strict attention paid to the quality control processes, advanced manufacturing rules and selection of the best materials and optimum designs give us the capabilities to be leader in our field and meet our customers' requirement.

We have conducted the standard tests specified in international standards, such as IEC .various tests, from chemical analysis of the materials to full-scale electrical and mechanical tests on polymer insulators, fulfilled in accredited independent international laboratories.

Our process is highly automated process mainly depend on high temperature and pressure vulcanized (HTV) shedded housing that is injected and vulcanized directly on the fiberglass rod already equipped with the crimped end fittings This guarantees its high quality, and total reliability.

All range of our insulators from the simplest to the most demanding of applications is produced with the same materials and technology.

Some of the advantages of ECMEI Polymer Insulators are:

- High mechanical strength and low weight using FRP rod that has a high mechanical and acid resistance utilizing ECR glass fiber reinforcement.
- Robust and shock resistance: anti-vandal
- Pollution resistance with weather sheds design Pollution resistance chemical or natural
- High hydrophobic housing
- very high track and arc resistance
- very low smoke emission and low toxicity
- Two metal end fittings radial compressed onto the Fiberglass rod.

45 SPI SILICONE LONG ROD INSULATORS**General features:**

The new ECMEI long rod insulators type 45SPI is one of our technologies marked with "Elsewedy Polymer Insulators". combine the highest levels of electrical insulation and mechanical tensile strength with a compact, light weight design. The superior design and low weight of 45SPI long rod insulators makes it especially suited for overhead compact line applications where low tower design and short line spans are required.

They are also more economical to transport and install. Polymer insulator of are one piece products up to 6 m with no joints on the housing (sheath) or at the weathershed interfaces. Housing is directly vulcanized to the core during compression molding process, providing superior bonding performance. Also, pressure controlled uniform crimping provides superior long-term mechanical performance.

Design:

The 45SPI insulator housing is HTV1 silicone rubber housing made by intelligent joint technique IJT2 by injection molding process. The HTV silicone is directly molded onto the core rod by overlapping the triple junction point and part of the metal end fittings. The design ensures a total enclosure of the most critical parts of a silicone insulator – the triple point (metal end fitting/FRP rod/silicone housing), where usually the highest electrical field strength is concentrated. This overlapping system eliminates any need of traditional sealing systems while preventing any moisture ingress attacks. On the basis of contamination level , We can propose best fit shed profile . Shed profile complies with IEC standard.

Core:

The core rod is a boron free, corrosion resistant ECR glass fiber reinforced plastic rod (FRP rod). Due to the extremely high hydrolysis and acid resistance of the FRP rod the risk of so called brittle fracture is completely eliminated for 45 SPI insulators.

End Fittings:

We use only the end fittings, made of high grade hot-dip galvanized forged steel not ductile cast iron to ensure the durability for very long time in different climatic condition, they are directly attached to the FRP core rod by a circumferential crimping process. Each crimping process is strongly monitored with a special control system. A complete range of end fittings according to the latest IEC and ANSI standards is available up to 340 kN of SML. The 45SPI is 100% exchangeable and compatible with existing insulators and line hardware of all types.

The special design of the end fitting in the junction minimizes the electrical field strength and partial discharge inside the junction zone as well as on the silicone housing surface, by utilizing an integrated grading ring. This reliably prevents corrosion of the insulating material and eliminates the risk of subsequent failure of the insulator.



45 SPI – HTV silicone rubber housing for best pollution performances

The excellent pollution layer characteristics of the HTV silicone rubber ensure maximum reliability of the 45SPI insulator, even under extreme service conditions like heavy sand storms or high IR levels in sunny areas. The high hydrophobic housing prevents the formation of conductive film on its surface. Even the most severe polluted conditions, such as salt fog in coastal regions or dust-laden air in industrial areas, cannot impair the intrinsic hydrophobicity of the HTV silicone rubber. Surface currents and discharges are ruled out. Neither water nor dirt on the housing surface can cause insulator flashovers.

Quality

According to long-established Elsewedy tradition and experience in high-voltage equipment for more than a 50 years, each production step for the 45SPI – beginning with numerous incoming raw material inspections through the assembly of the individual components to routine tests of the finished product – is rigorously monitored and well controlled

Long Lasting Service Life-No moisture ingress

The intelligent joint technique for housing of the 45SPI insulators, weather sheds design and core rod sheath (coating) with optimal design triple junction point, all work in coherent performance to minimize the electrical field stress, which can easily lead to erosion damage of the polymer interfaces. In particular leading to erosion of the bonding between sheds and rod sheath, and thus damage to the insulator housing. Triple junction point in the connection zone, where all three elements (FRP rod, metal end fitting, and silicone housing) meet each other, is absolutely water- and air-tight sealed during manufacturing by using an overmolding housing system.

It totally encloses this junction point with the HTV silicone rubber of the housing itself. Also the highest bonding strength of the HTV silicone housing to the FRP core rod via special interface material combined with the overmolding design system prevent moisture ingress at the connection zone of the insulator.

Minimized electrical field strength

After numerous electrical calculations regarding E-field distribution along the insulator, and the connection zone on the High-voltage side in particular, the design of the 45SPI insulator was optimized for maximum reduction of electrical field stress, reduced corona effect, and minimized RIV value.

Two design keys ensure improved life expectancy by reducing electrical field stress in the triple point and on the silicone surface:

- The spherical-shaped rim of the end fitting inside the housing homogenizes the E-field distribution on the high-voltage side of the 45SPI insulator with an integrated grading ring up to 170 kV.
- The over molded design system and the silicone housing shape at the connection zone reduce the electrical field strength inside the housing, at the inner triple point in particular, as well as on the silicone surface directly. This by displacing the higher electrical field strength outside the housing (i.e. to the surrounding air area), and by taking advantage of the higher silicone relative permittivity.
- In this way, 45SPI insulators can be applied on 170 kV systems without the need for additional grading/corona rings.





Standards & Tests

All 45SPI long rod insulators are designed and tested in compliance with the latest IEC standards.

Each 45SPI insulator is routinely tested with a corresponding mechanical tensile test load of at least 50 percent of the defined SML load for at least ten seconds.

IEC 61109 Insulators for overhead lines – Composite suspension and tension insulators for a.c. systems with a nominal voltage greater than 1,000 V

IEC 62217 Polymeric insulators for indoor and outdoor use with a nominal voltage >1,000 V

IEC 60815 Selection and dimensioning of high-voltage insulators intended for use in polluted conditions

IEC 61466-1, -2 Composite string insulator units for overhead lines with a nominal voltage greater than 1,000 V

Configuration of End Fitting:

Dimensions in mm

SML (Specified Mechanical Load): The SML is a load specified by the manufacture that has to be verified during a mechanical test. It forms the basis for selection of an insulato RTL (Routine Test Load):

The RTL is rating equal to 50% of the SML.

SOCKET & BALL ACC TO IEC 60120

| Designation | SML |
|-------------|------------------------|
| 16 | 70kN/ 100kN/ 120kN |
| 20 | 120 KN/ 160 KN/ 210 KN |
| 24 | 210kN/ 340kN |



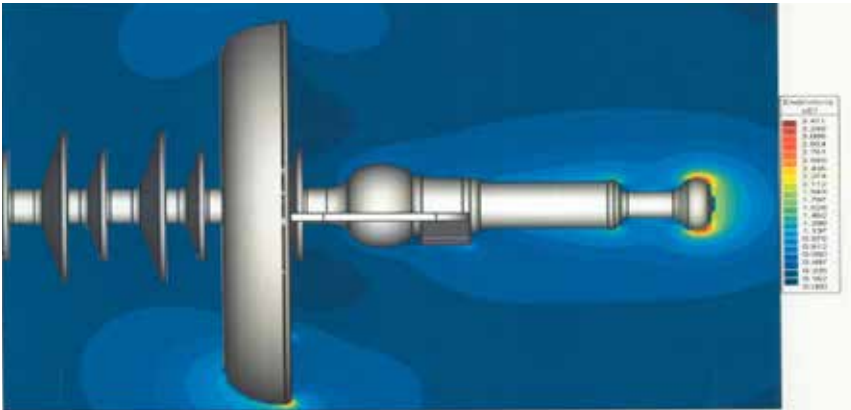
CLEVIS

| Designation | SML |
|-------------|--------------|
| 13L | 70kN |
| 16L | 100kN/ 120kN |
| 16N | 100kN/ 120kN |
| 19L | 160 kN |
| 19N | 160 kN |
| 22L | 210kN |
| 22N | 210kN |

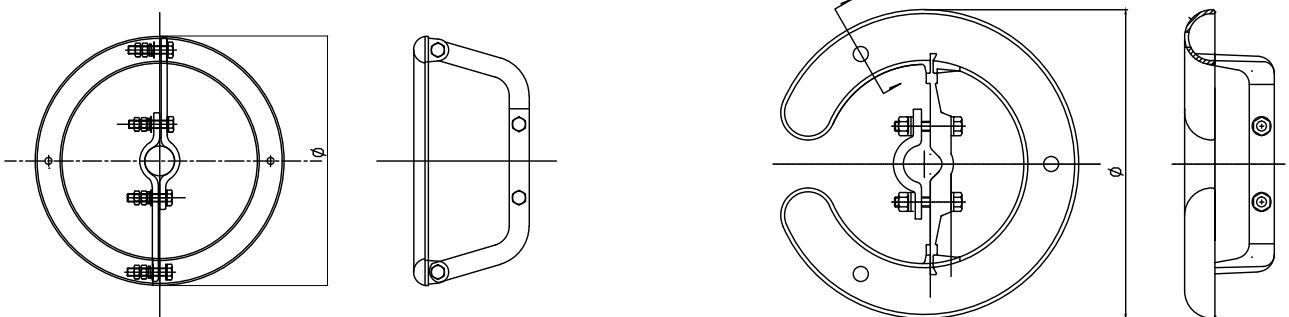


Accessories:

Arc protection devices such as arcing horns and corona rings for reduction of electrical field stress Customer-specific solutions as well as other connection and cable clamps are also available on request.



Corona are carefully designed based on numerous electrical simulations regarding electrical field distribution. For system voltages above 170 kV corona rings are included in 45SPI



Corona Ring



Recommended corona rings (diameter in mm) by line voltage

| Line voltage (KV) | Ground end (top end fitting) | Line end (conductor end fitting) |
|-------------------|------------------------------|----------------------------------|
| ≤ 170 | None | None |
| 245 | None | Ø 250 |
| 420 | Ø 310 | Ø 310 |
| 550 | Ø 310 | Ø 310 |

Nominal operated voltage and related SML

| Maximum values | Units | PL3 | PL0 | PL1 | PL2 | |
|-----------------------------------------|---------|-----|-----|------|------|-----|
| Highest voltage for equipment, Um | From to | KV | 12 | 72.5 | 245 | 420 |
| | | KV | 36 | 145 | <420 | 550 |
| Nominal system voltage , Un | From to | KV | 11 | 66 | 220 | 400 |
| | | KV | 33 | 132 | <400 | 500 |
| Specified mechanical failing load (SML) | From to | KN | 70 | 100 | 120 | 160 |
| | | KN | 100 | 160 | 210 | 340 |

BALL & SOCKET LONG ROD INSULATOR

Ball & socket long rod polymer insulator for suspension and tension applications are available up to 765 KV .Just afew selected insulator are listed below , Shorter or longer lengths and mechanical load are available on request .

| CAT.NO. | * Highest voltage KV | insulator Length (H) mm | Arcing distance mm | Leakage path mm | Coupling size | Wet Power freq. withstand Kv | Lightening impulse withstand KV | Specified mechanical load (SML) KN | Routine test load KN | Approx. weight KG |
|-------------|----------------------|-------------------------|--------------------|-----------------|---------------|------------------------------|---------------------------------|------------------------------------|----------------------|-------------------|
| PL09016H300 | 12 | 355 | 205 | 560 | 16A | 80 | 170 | 90 | 45 | 1.45 |
| PL09016H301 | 24 | 488 | 340 | 1100 | 16A | 100 | 200 | 90 | 45 | 1.9 |
| PL09016H303 | 36 | 578 | 440 | 1400 | 16A | 115 | 220 | 90 | 45 | 2.3 |
| PL09016H302 | 36 | 623 | 475 | 1620 | 16A | 130 | 250 | 90 | 45 | 2.4 |
| PL10016H000 | 72.5 | 1110 | 1000 | 3600 | 16A | 300 | 500 | 100 | 50 | 4.75 |
| PL12016H000 | 72.5 | 1128 | 1000 | 3600 | 16A | 300 | 500 | 120 | 60 | 5 |
| PL12020H000 | 72.5 | 1145 | 1000 | 3600 | 20 | 300 | 500 | 120 | 60 | 5.3 |
| PL16020H000 | 72.5 | 1196 | 1000 | 3600 | 20 | 300 | 500 | 160 | 80 | 6.25 |
| PL10016H001 | 145 | 1290 | 1180 | 4320 | 16A | 350 | 650 | 100 | 50 | 5.5 |
| PL12016H001 | 145 | 1305 | 1180 | 4320 | 16A | 350 | 650 | 120 | 60 | 5.75 |
| PL12020H001 | 145 | 1325 | 1180 | 4320 | 20 | 350 | 650 | 120 | 60 | 6 |
| PL16020H001 | 145 | 1375 | 1180 | 4320 | 20 | 350 | 650 | 160 | 80 | 6.7 |
| PL10016H005 | 145 | 1690 | 1585 | 5950 | 16A | 400 | 750 | 100 | 50 | 7.1 |
| PL12016H002 | 145 | 1710 | 1585 | 5950 | 16A | 400 | 750 | 120 | 60 | 7.4 |
| PL12020H002 | 145 | 1725 | 1585 | 5950 | 20 | 400 | 750 | 120 | 60 | 8.2 |
| PL16020H001 | 145 | 1765 | 1585 | 5950 | 20 | 400 | 750 | 160 | 80 | 8.9 |
| PL12016H003 | 145 | 1890 | 1765 | 6650 | 16A | 510 | 950 | 120 | 60 | 8.7 |
| PL12016H101 | 245 | 2030 | 1835 | 7220 | 16A | 460 | 1050 | 120 | 60 | 9 |
| PL16020H101 | 245 | 2047 | 1850 | 7220 | 20 | 460 | 1050 | 160 | 80 | 10.7 |
| PL12016H100 | 245 | 3202 | 3075 | 11930 | 20 | 645 | 1600 | 120 | 60 | 12.5 |
| PL16020H100 | 245 | 3255 | 3075 | 11930 | 20 | 645 | 1600 | 160 | 80 | 13.5 |
| PL16020H201 | 420 | 4750 | 4560 | 17890 | 20 | 680 | 1800 | 160 | 80 | 19.7 |
| PL21020H201 | 420 | 4750 | 4560 | 17890 | 20 | 680 | 1800 | 210 | 105 | 19.7 |
| PL16020H200 | 550 | 6240 | 6045 | 23875 | 20 | 710 | 2250 | 160 | 80 | 24.7 |
| PL21020H200 | 550 | 6240 | 6045 | 23875 | 20 | 710 | 2250 | 210 | 105 | 24.7 |

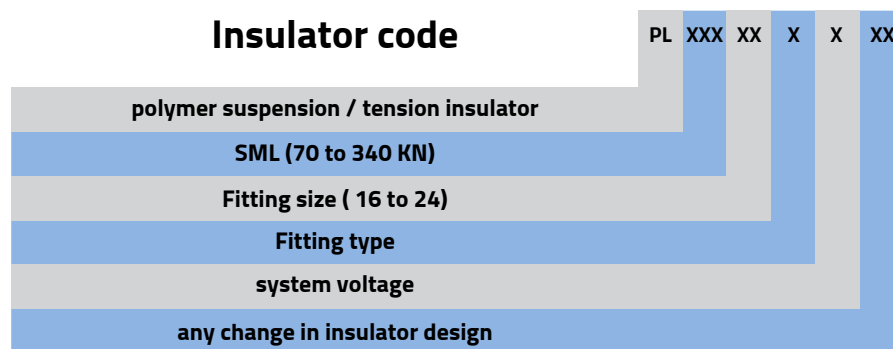


SOCKET/SOCKET LONG ROD INSULATOR

Socket/ socket long rod polymer insulator for suspension and tension applications are available up to 765 KV .Just a few selected insulator are listed below , Shorter or longer lengths and mechanical load are available on request

| CAT.NO. | * Highest voltage KV | insulator Length (H) mm | Arcing distance mm | Leakage path mm | Coupling size | Wet Power freq. withstand Kv | Lightening impulse withstand KV | Specified mechanical load (SML) KN | Routine test load KN | Approx. weight KG |
|-------------|----------------------|-------------------------|--------------------|-----------------|---------------|------------------------------|---------------------------------|------------------------------------|----------------------|-------------------|
| PL09016S300 | 12 | 343 | 195 | 560 | 16A | 80 | 170 | 90 | 45 | 1.75 |
| PL09016S301 | 24 | 476 | 330 | 1100 | 16A | 100 | 200 | 90 | 45 | 2.2 |
| PL09016S303 | 36 | 566 | 430 | 1400 | 16A | 115 | 220 | 90 | 45 | 2.6 |
| PL09016S302 | 36 | 611 | 465 | 1620 | 16A | 130 | 250 | 90 | 45 | 2.7 |
| PL10016S000 | 72.5 | 1098 | 990 | 3600 | 16A | 300 | 500 | 100 | 50 | 5 |
| PL12016S000 | 72.5 | 1116 | 990 | 3600 | 16A | 300 | 500 | 120 | 60 | 5.3 |
| PL12020S000 | 72.5 | 1134 | 990 | 3600 | 20 | 300 | 500 | 120 | 60 | 5.6 |
| PL16020S000 | 72.5 | 1180 | 990 | 3600 | 20 | 300 | 500 | 160 | 80 | 6.5 |
| PL10016S001 | 145 | 1278 | 1170 | 4320 | 16A | 350 | 650 | 100 | 50 | 5.3 |
| PL12016S001 | 145 | 1293 | 1170 | 4320 | 16A | 350 | 650 | 120 | 60 | 6 |
| PL12020S001 | 145 | 1314 | 1170 | 4320 | 20 | 350 | 650 | 120 | 60 | 6.3 |
| PL16020S001 | 145 | 1360 | 1170 | 4320 | 20 | 350 | 650 | 160 | 80 | 7 |
| PL10016S005 | 145 | 1675 | 1575 | 5950 | 16A | 400 | 750 | 100 | 50 | 7.4 |
| PL12016S002 | 145 | 1695 | 1575 | 5950 | 16A | 400 | 750 | 120 | 60 | 7.7 |
| PL12020S002 | 145 | 1710 | 1575 | 5950 | 20 | 400 | 750 | 120 | 60 | 8.5 |
| PL16020S001 | 145 | 1810 | 1575 | 5950 | 20 | 400 | 750 | 160 | 80 | 9.2 |
| PL12016S003 | 145 | 1875 | 1755 | 6650 | 16A | 510 | 950 | 120 | 60 | 9 |
| PL12016S101 | 245 | 2018 | 1825 | 7220 | 16A | 460 | 1050 | 120 | 60 | 9.3 |
| PL16020S102 | 245 | 2030 | 1840 | 7220 | 20 | 460 | 1050 | 160 | 80 | 11 |
| PL12016S100 | 245 | 3190 | 3065 | 11930 | 20 | 645 | 1600 | 120 | 60 | 12.8 |
| PL16020S100 | 245 | 3240 | 3065 | 11930 | 20 | 645 | 1600 | 160 | 80 | 13.8 |
| PL16020S201 | 420 | 4734 | 4550 | 17890 | 20 | 680 | 1800 | 160 | 80 | 20 |
| PL21020S201 | 420 | 4734 | 4550 | 17890 | 20 | 680 | 1800 | 210 | 105 | 20 |
| PL16020S200 | 550 | 6225 | 6035 | 23875 | 20 | 710 | 2250 | 160 | 80 | 25 |
| PL21020S200 | 550 | 6225 | 6035 | 23875 | 20 | 710 | 2250 | 210 | 105 | 25 |

CODING STRUCTURE



Elsewedy Fitting



ELSEWEDY OVERHEAD TRANSMISSION METAL FITTING SF

Introduction:

Elsewedy Fitting (SF) is our trusted mark which ECMEI introduces as metal fitting configurations required for insulators string up to 500 kV overhead transmission lines

- Long rod string
- Cap & Pin string
- Polymeric string
- Ground wire strings
- Conductor's accessories
- Ground wire accessories

Manufacturing facility:

ECMEI operates from a purpose built unit which is committed to produce high quality products relating of Fitting for Overhead Transmission segment of the Power Industry SF manufacturing program offers wide range of solutions for its customers based in different parts of world.

Quality Control:

Whole process under strict & stringent quality control at every stage from raw materials to finished products. The factory is also equipped with a tool development facility, R & D Unit with a State of the advanced Laboratory capable of conducting various tests as per customer requirements & various standards.

Material Used for Transmission Line Equipment:

• Aluminum

Parts in contact with aluminum or aluminum alloy conductors should be made of aluminum to prevent fretting corrosion. Suspension clamp, strain clamps, spacers, parallel groove clamps etc. are cast from aluminum or aluminum alloys. Aluminum being a good conductor material, aluminum clamps affords high short circuit resistance and largely eliminates inherent losses, as they are non-magnetic.

• Steel

The following parts are mainly made of steel:

Drop Forged Steel : All insulator string accessories subject to pull (sag) load such as Ball eye, Double Eye Clamps etc.

Sheet Steel : Yoke Plates.

Flat Bar Stock : Suspension are Yoke Shackles Extension Links.

Round Bar or Tubular Stock : Arcing and Guard fittings.

Screw Steel : Rivet head bolts, Threaded bolts etc.

All steel components are hot dip galvanized conforming to BS-729

• Galvanizing Steel

Hot Zinc galvanizing is considered to be the most effective protective coating for steel and malleable cast iron under normal conditions. That is why we exclusively use hot galvanizing wherever possible. A farther advantage of this protective method that zinc remains relatively inert against other metals such as aluminum or copper, so that it can brought into direct with them without reservation.

To ensure that dimension of bolts, holes eyes, clevises etc. will be accurate after galvanizing, blanks are made accordingly, ie. screw threads are cut undersize, hexagons of socket head fasteners are pressed oversize.

Galvanizing and the corresponding test are carried out according to Bs 729 specification and renowned international Standards.

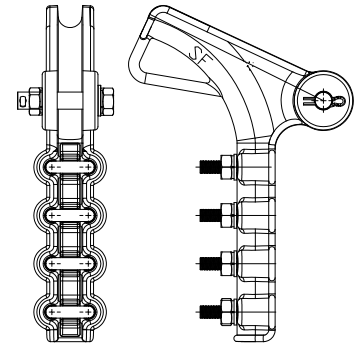
INSULATOR STRING FITTING

Insulator fitting set up to 36 Kv

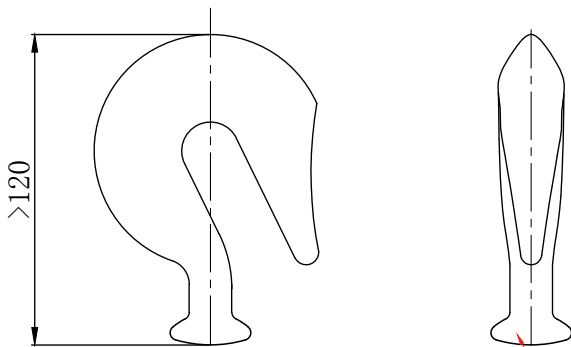
It is the string which contain some of the following parts to make a complete insulator string mainly for disc and long rod insulators

***Tension clamp**

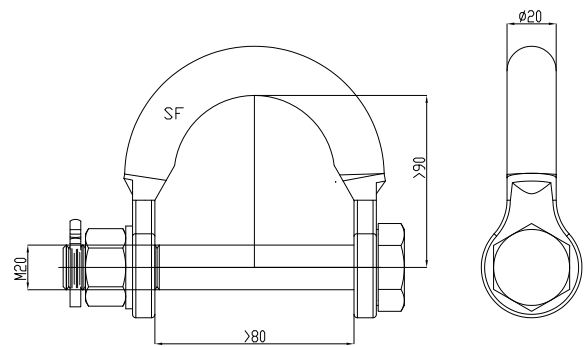
| Code | No. of bolts | Conductor Dia. (mm) | | Ultimate strength (KN) |
|------|--------------|---------------------|----|------------------------|
| | | From | To | |
| A-01 | 2 | 4 | 10 | 45 |
| B-01 | 3 | 10 | 18 | 70 |
| C-01 | 3 | 14 | 22 | 90 |
| D-01 | 4 | 18 | 24 | 100 |



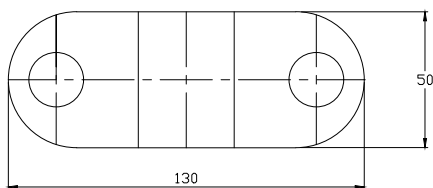
Tension Clamp



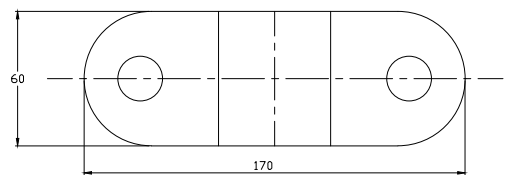
Hook IEC 120 ball size 16A



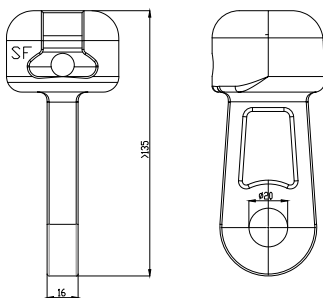
Chain Shackle



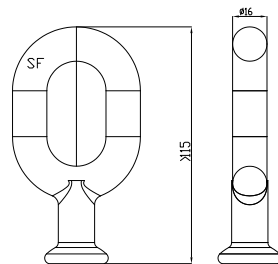
Extension link for 3u bolt tension clamp



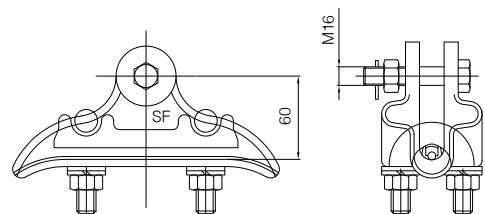
Extension link for 4u bolt tension clamp



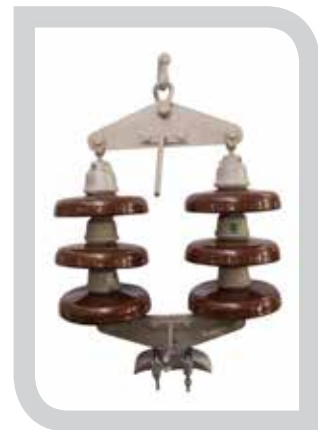
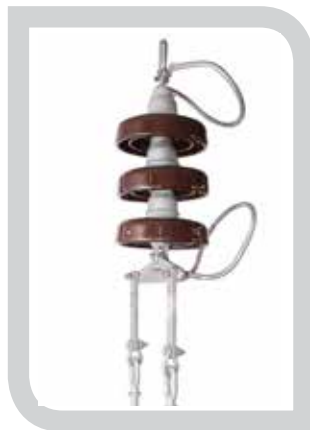
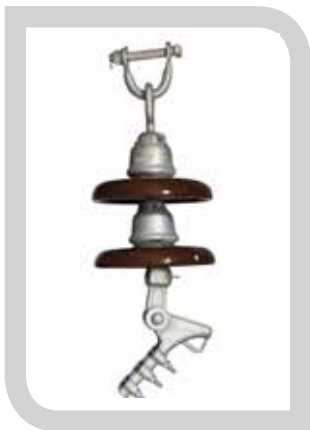
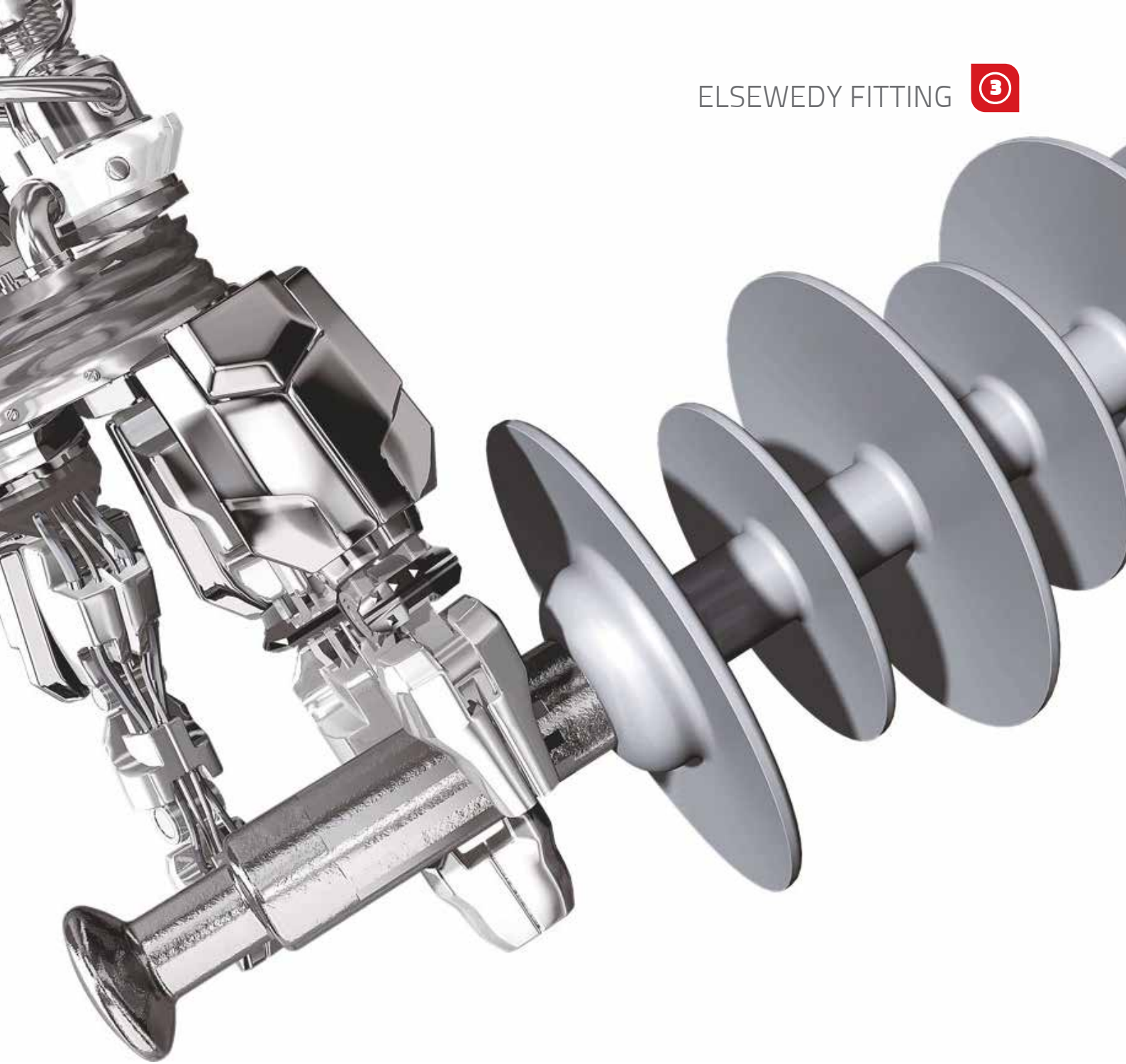
Socket Eye



IEC 120 ball size 16A Ball eye



Suspension Clamp



RTV Coating



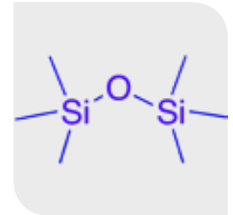
Porcelain strength meets hydrophobicity

To avoid leakage currents, discharges and pollution flashovers, a silicone layer is applied to the insulator surface by using a special spray coating technique. This silicone layer provides a hydrophobic surface, combating the negative effects of contamination and enhancing the electrical characteristics and low leakage currents in highly polluted areas.

ECMEI is one of the few insulator manufacturers who is able to offer RTV coating directly to our customers without involving an external company for this service.

Definitions: RTV silicone

RTV Silicone (Room Temperature Vulcanizing silicone) is a type of silicone rubber made from a two-component system (base plus curative; A+B) available in a hardness range of very soft to medium - usually from 15 Shore A to 40 Shore. RTV Silicones can be cured with either a platinum catalyst or a tin catalyst. Applications include low temperature over molding, making molds for reproducing, and some optically clear grades have lens applications.

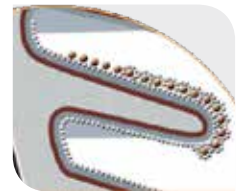


Vulcanization or vulcanization is a chemical process for converting rubber or related polymers into more durable materials via the addition of sulfur or other equivalent "curatives" or "accelerators".

These additives modify the polymer by forming crosslinks (bridges) between individual polymer chains. Vulcanized materials are less sticky and have superior mechanical properties. A vast array of products are made with vulcanized rubber including tires, shoe soles, hoses, conveyor belts and hockey pucks. The process is named after Vulcan, Roman god of fire. Hard vulcanized rubber is sometimes sold under the brand names ebonite or vulcanite, and is used to make hard articles such as bowling balls and saxophone mouth pieces.

Hydrophobicity Transfer

In the case of pollution particle deposition on the coated layer, the low molecular weight (LMW) siloxanes will spread from the silicone bulk material to the pollution layer and encapsulates these particles within a short time period. Now the insulator surface is hydrophobic again.

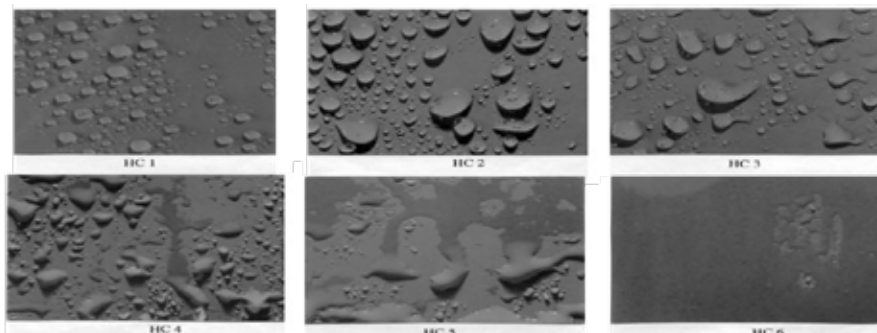


In-house coating is especially advantageous for projects using new insulators. A product ready to be installed is delivered and a hydrophobic insulator surface is assured from the first day. De-energizing of the substations for frequent washing is no longer required and maintenance expenditure is reduced to a minimum compared to conventional porcelain insulator surfaces.



Main benefits of RTV-Silicone coating:

- Excellent self cleaning characteristics and long-term resistance to weathering and difficult environments.
- Long-term hydrophobicity due to the migration of low molecular weight (LMW) siloxanes into the pollution layer
- Suppression of leakage current, discharges and pollution flashover.
- Long-term RTV stability makes repeated application of grease unnecessary.
- Reduced maintenance expenditure, as in washing, compared to conventional insulator surfaces
- RTV coated surfaces withstand high pressure jet washing up to 90 bar (normal application, 25cm distance).
- The best of both worlds, mechanical strength of porcelain and pollution performance of silicone rubber
- Non toxic and environmentally friendly material.
- Transmission reliability as well as environmental and resource conservation by efficiently utilizing generated power.



Certificates & Approvals




SYSTEM CERTIFICATES



CUSTOMER APPROVALS & PRODUCT CERTIFICATES





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