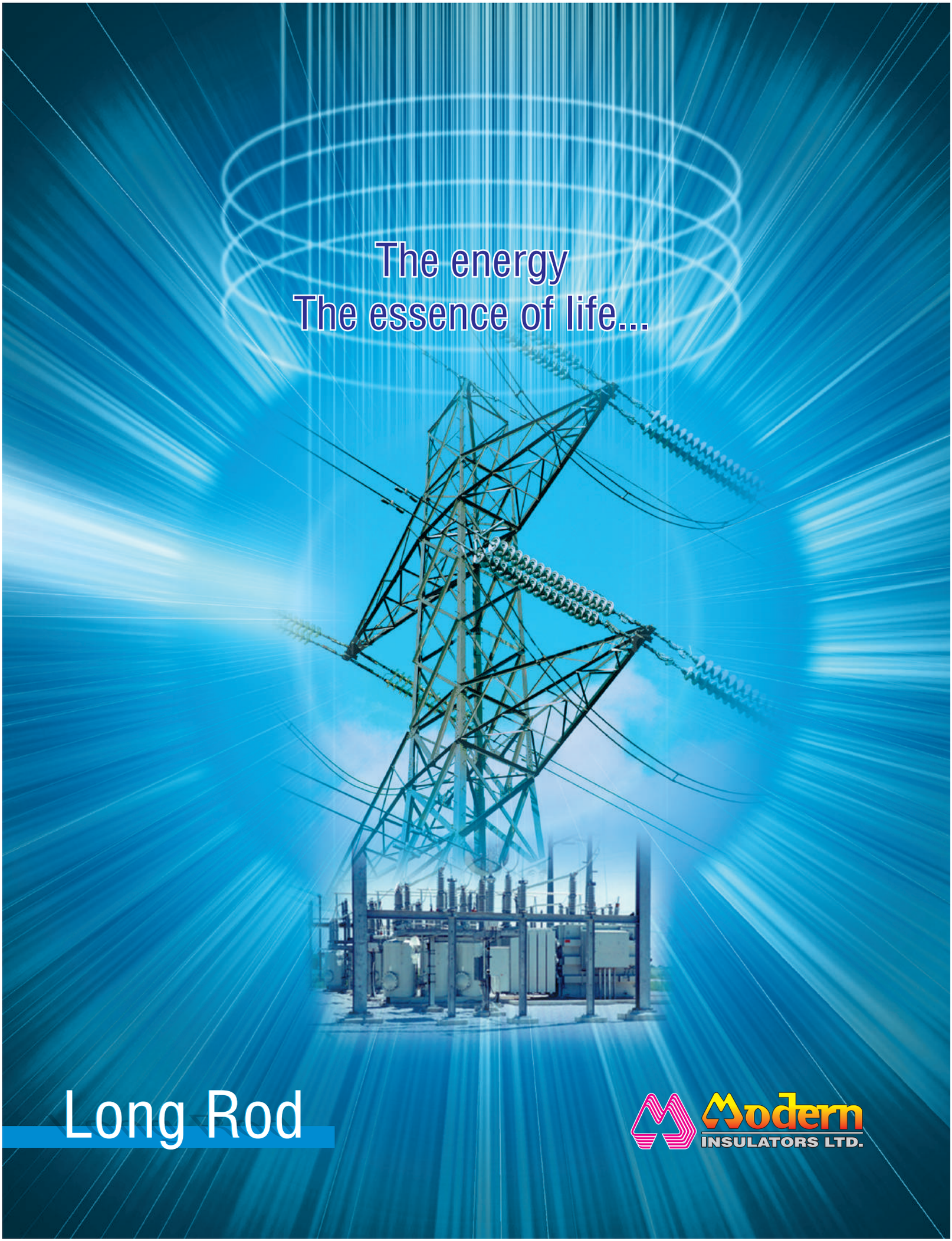

The energy
The essence of life...
Long Rod
Modern
INSULATORS LTD.

Modern
INSULATORS LTD.

# MODERN GROUP

The Modern Group of Industries is one of the leading textile and engineering industrial groups having five manufacturing units in the States of Rajasthan and Gujarat. The group employs over 7000 people and has collaborations with renowned manufacturers in their respective fields from Germany, U.K. and other European countries.

Modern Woollens

Modern Insulators

Modern Denim

Modern Terry Towels

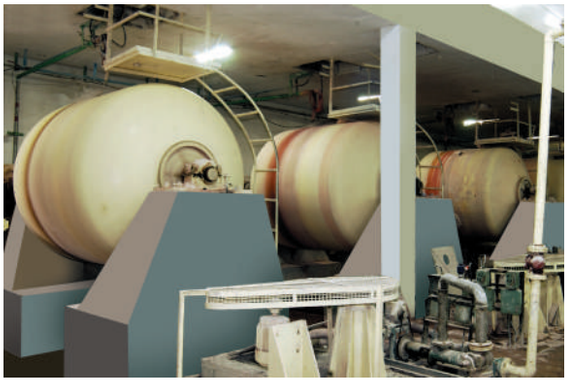
Modern Petrofils




ISO 14001:2004


ISO 9001:2000

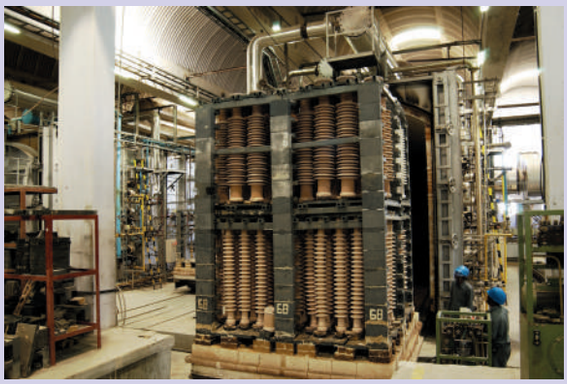
# MODERN INSULATORS




The Modern group diversified into the manufacture of high technology products for the power sector and promoted Modern Insulators Ltd. (MIL) in co-operation with the Rajasthan State Industrial Investment Corporation (RIICO), a State Government undertaking and in technical collaboration with Siemens AG, Germany, it manufactures extra high voltage alumina porcelain insulators for transmission lines, sub stations and electrical eqipment.

The unique nature of the factory of 'Modern Insulators Ltd', as its name implies, is that it possesses

the most modern and advanced eqipment for the manufacture of high voltage alumina porcelain solidcore insulators and bushings. The infrastructural facilities for production, testing and quality control in the plant are comparable with that of U.K.. Japan and other developed countries.



Modern's research & development wing and technical team are of well-known specialists from the Indian insulator industry with indepth experience in the field of ceramic technology, design, production and quality control. The plant is operated by highly qualified technical personnel, high caliber engineers and technicians, who have been specially trained in their respective fields at Siemens AG, Germany.

Modern have a specialised Quality Control Division to take care of inspection right from raw materials to the final packing of the products, with a close monitoring of quality at each & every stage.

The technical personnel have constant interaction with experts in the field, in India and abroad, to keep abreast with the latest technological advancements taking place around in the world.

Time to time CAPEXIL a government of India body recognises MIL efforts in exports by rewarding with prestigious top export awards.

# TECHNICAL NOTES

Long rod insulators manufactured from Alumina-Porcelain for use in high voltage transmission lines have been in use since 1960 in European countries. The experience reveals superior performance in electrical and mechanical properties, power arc and interference voltage behaviour. They are manufactured according to the wet process technology from Siemens AG, Germany, who are pioneers in the field of electro porcelain for high voltage systems. Alumina Porcelain Insulators in comparison with Silica Porcelain insulators offer enhanced dielectric strength, higher resistance to thermal shock, higher mechanical strength and resistance to ageing with improved thermal conductivity.

At every stage, right from the selection of raw materials to the manufacture of the finished product, extreme care is taken to adhere to international standards. MILs stringent quality control and testing facilities ensure quality products through the enforcing of manufacturing discipline and technological excellence at every stage in the process of manufacturing. The design principle of the Cap & Pin type disc insulators used in high voltage transmission lines have some fundamental deficiencies which lead to failures and breakdowns due to -

- Punctures caused by high electric fields and stresses between the cap and pin.
- Poor Insulating property under pollution due to shed profiles of deep corrugations.
- Higher interference voltage caused by partial discharge near the pin.
- Corrosion of ball pins caused by leakage currents under polluted conditions etc.

The development of an Alumina Porcelain body with increased mechanical strength has resulted in the manufacture of long rod insulators which overcome the above noted disadvantages of disc insulators used in extra high voltage transmission lines.

# SALIENT ADVANTAGES OF LONG ROD INSULATORS

### Absolutely Puncture Proof

Solid Core Long Rod Insulators manufactured by Modern Insulators Limited are non-puncturable type 'A' insulators as per IEC/IS specifications.

### Excellent Service Reliability

Solid Core Long Rod Insulators made of high strength Alumina Porcelain can withstand continuous or changing mechanical, electrical and thermal influences. Superior dielectric and mechanical properties of Long Rod Insulators improve the reliability and stability of high voltage and extra high voltage transmission lines.

### Excellent Pollution Performance

Solid Core Long Rod Insulators can give excellent performance in heavily polluted regions because of their construction features, configurations and shed profiles with improved self cleaning characteristics under wind and rain.

### Improved Voltage distribution and full power arc protection

The intermediate metallic connections in the case of Long Rod Insulators is drastically reduced resulting in improved voltage distribution. The configuration with larger diameter end fittings helps for better electrical shielding and power arc protection.

### Very Low Radio & TV Interference

The solid core design of Long Rod Insulators with no, or few intermediate metal parts and few diagonal and transverse boundary areas, with rounded off electrode configurations leads to lower RIV and Television interference.

### Reduced Maintenance and Replacement Cost.

Solid Core Long Rod Insulators hardly require any maintenance after installation because of their design features with self cleaning characteristics. The experience reveals hardly any breakage or fracture of insulators in service, due to cascading flashovers or punctures.

### Mil's Long Rod Insulators Tested in Overseas Laboratory

MIL developed Long Rod Insulator string' with creepage distance of 45mm/kV as per specification of Egyptian Electricity Authority, Cairo and have undertaken high voltage test and power arc test in the overseas laboratory .of EGU PRAGUE, Czech Republic. The 220kv string has been subjected to power arc test with power arc current value of 40 KA-rms for duration of 0.5 seconds. - .

## Pollution level and minimum nominal creepage distances to be adopted as per I.S./I.E.C.

| Pollution Level | Minimum Nominal Creepage Distance (mm/Kv)* | Type of Fbllution |
|---|---|---|
| Light | 16 | Non-Industrial, agricultural, mountainous areas beyond 20 kms from the sea. |
| Medium | 20 | Industrial area without polluting smoke and chemical effluents and not too close to the sea. |
| Heavy | 25 | Industrial area with polluting smoke & chemical efflulents close to sea and exposed to strong winds from the sea. |
| Very Heavy | 31 | Industrial area subjected to conductive dust pollution & smoke and very close to the sea, exposed to seaspray & very strong winds from sea, desert areas etc. |

* 1) As per IEC ratio between creepage distance, measured between phase and the earth over the RMS phase to phase value of the highest voltage of the equipment.

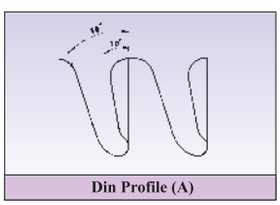
2} For the actual creepage distance, specified manufacturing tolerances will apply as per IEC-60383.

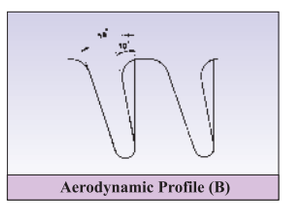
In respect of locations with extreme pollution severity, specific nominal creepage distance exceeding 31mm/Kv may have to be adopted along with pollution preventive methods such as periodical washing, greasing etc.

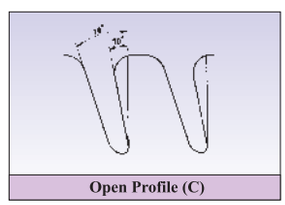
## SHED PROFILES

MIL adopts different shed profiles in accordance with IEC publications, IEC - 60815

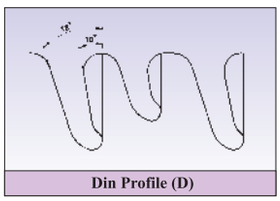
**Normal Sheds**

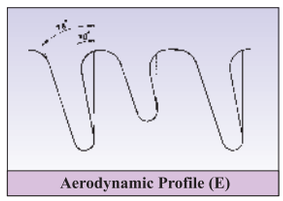

Din Profile (A)

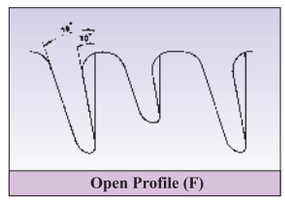

Aerodynamic Profile (B)


Open Profile (C)

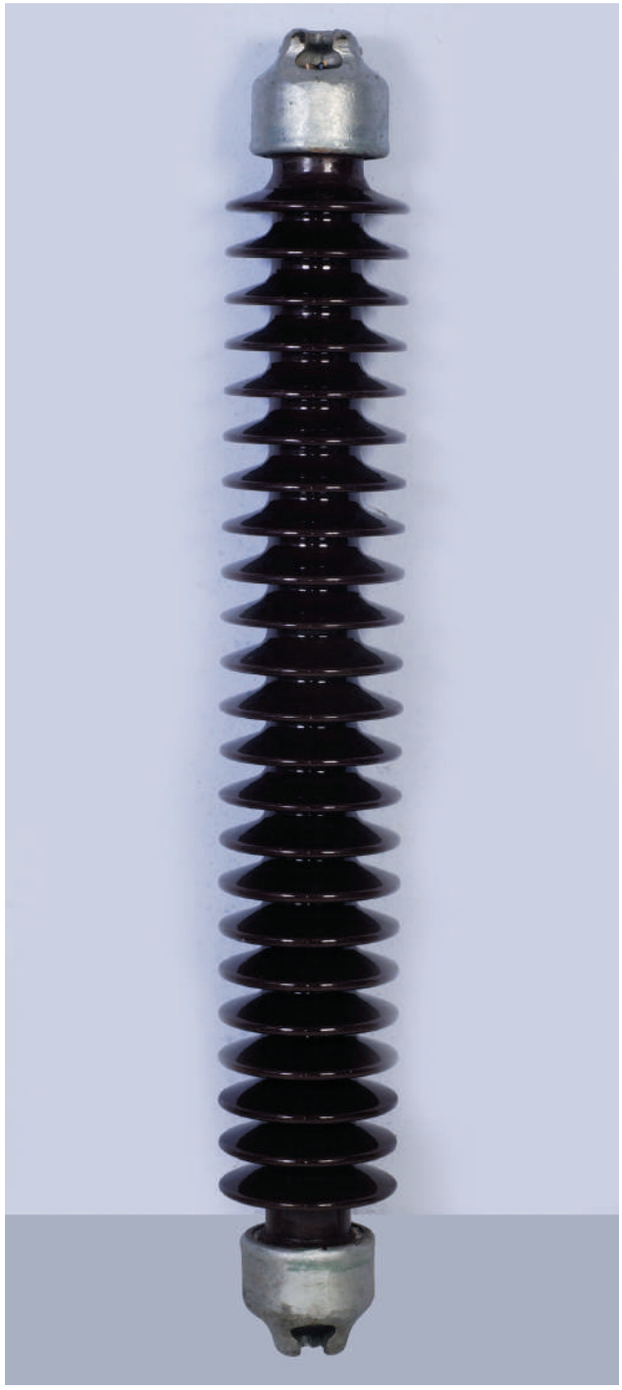
**Alternating Sheds**

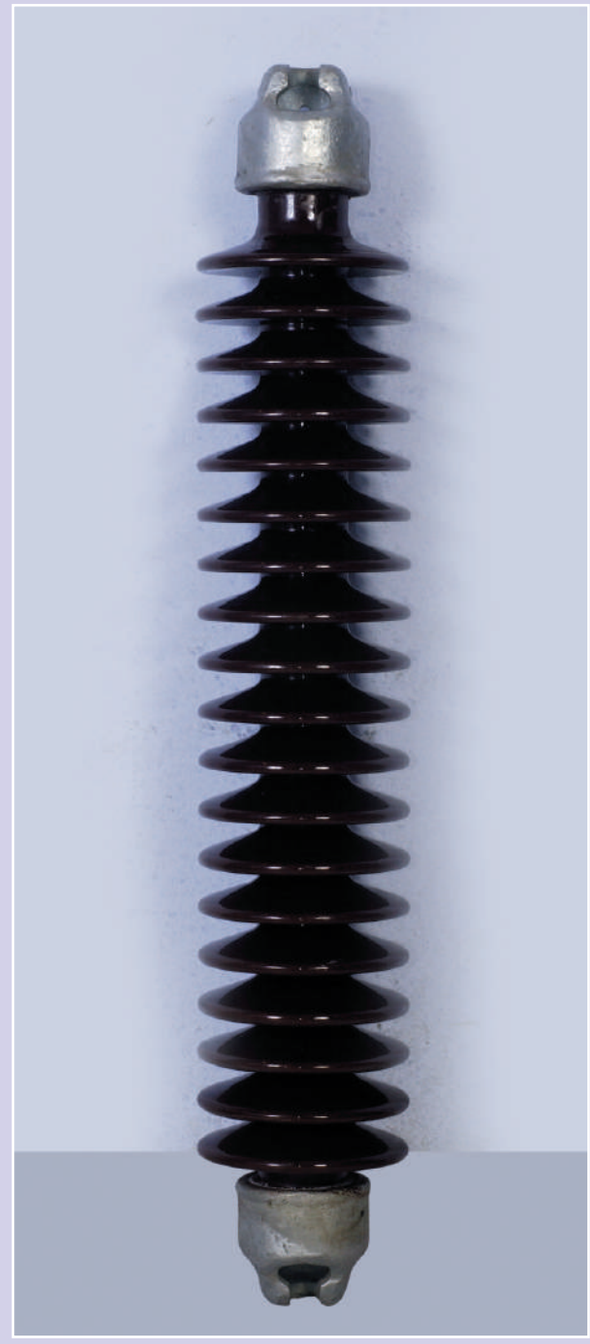

Din Profile (D)


Aerodynamic Profile (E)


Open Profile (F)

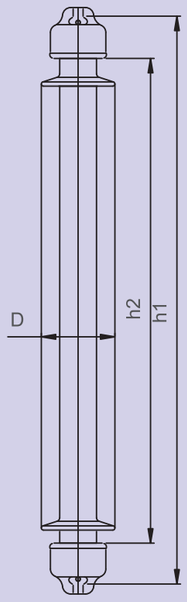
SHED PROFILE AS PERIEC 60815





# LONG ROD INSULATORS
# BALL & SOCKET TYPE (SINGLE UNIT)

STRENGTH - 70/120 KN




| TYPE | DIN DESIGNATION | LP60/6A/450 | LP60/6A/450 | LP60/6A/450 | LP60/6A/450 | LP60/8E/850 | LP60/15A/870 | LP75/9E/870 | LP60/16A/1250 |
|---|---|---|---|---|---|---|---|---|---|
| | IEC DESIGNATION | - | L 70 BE 310 | L 70 BE 380 | - | - | - | - | L90 BE 1000 |
| Drawing No. | | 111-C-141 | 111-C-004 | 111-C-187 | 111-C-068 | 111-C-266 | 111-C-144 | 111-C-301 | 111-C-307 |
| Spacing ( h1 ) mm. | | 450 | 520 | 549 | 725 | 850 | 870 | 870 | 1250 |
| Cermaic length between caps ( h2) mm. | | 285 | 355 | 384 | 560 | 685 | 705 | 679 | 1085 |
| Min. nominal creepage distance (mm.) | | 850 | 650 | 1120 | 1460 | 1850 | 1850 | 1850 | 1960 |
| Largest shed dia ( D ) mm. | | 170 | 120 | 175 | 150 | 160 | 160 | 175 | 130 |
| Type of shed ( Ref. page No. 6 ) | | A | A | B | A | E | A | E | A |
| Mechanical failing load (Tension) | kN | 80 | 80 | 90 | 90 | 80 | 80 | 120 | 90 |
| Routine test load ( Tension ) | kN | 64 | 64 | 72 | 72 | 64 | 64 | 96 | 72 |
| Wet P.F. withstand voltage | kV(rms) | 75 | 90 | 95 | 140 | 160 | 160 | 140 | 230 |
| Impulse withstand voltage | kVp | 170 | 210 | 250 | 325 | 350 | 350 | 350 | 550 |
| Visible discharge voltage | kV(rms) | 27 | 27 | 27 | 55 | 55 | 55 | 55 | 88 |
| Coupling size | mm. | 16 | 16 | 16 | 16 | 16 | 16 | 20 | 16 |
| Net weight ( approx. ) | kgs. | 12 | 10 | 13 | 16 | 19 | 20 | 24 | 21 |

| TYPE | DIN DESIGNATION | LP60/30A/1260 | LP75/19B/1250 | LP75/23A/1260 | LP60/22B/1305 | LP75/15F/1305 | LP85/26A/1450 | LP85/17E/1450 | LP85/30B/1595 |
|---|---|---|---|---|---|---|---|---|---|
| | IEC DESIGNATION | L 90 BE 1000 | L120 BE1000 | L 120 BE 1000 | - | - | - | - | - |
| Drawing No. | | 111-C-067 | 111-C-308 | 111-C-120 | 111-C-039 | 111-C-278 | 111-C-040 | 111-C-155 | 111-C-326 |
| Spacing ( h1 ) mm. | | 1260 | 1250 | 1260 | 1305 | 1305 | 1450 | 1450 | 1595 |
| Cermaic length between caps ( h2) mm. | | 1095 | 1059 | 1070 | 1105 | 1134 | 1237 | 1237 | 1358 |
| Min. nominal creepage distance (mm.) | | 2950 | 1960 | 2900 | 2630 | 4000 | 3200 | 4300 | 3212 |
| Largest shed dia ( D ) mm. | | 135 | 145 | 175 | 155 | 200 | 180 | 205 | 170 |
| Type of shed ( Ref. page No. 6 ) | | A | B | A | B | F | A | E | B |
| Mechanical failing load (Tension) | kN | 90 | 120 | 120 | 70 | 90 | 120 | 120 | 90 |
| Routine test load ( Tension ) | kN | 72 | 96 | 96 | 56 | 72 | 96 | 96 | 72 |
| Wet P.F. withstand voltage | kV(rms) | 230 | 230 | 230 | 275 | 275 | 275 | 275 | 275 |
| Impulse withstand voltage | kVp | 550 | 550 | 550 | 650 | 650 | 650 | 650 | 650 |
| Visible discharge voltage | kV(rms) | 88 | 88 | 88 | 105 | 105 | 105 | 105 | 105 |
| Coupling size | mm. | 16 | 20 | 20 | 16 | 16 | 20 | 20 | 16 |
| Net weight ( approx. ) | kgs. | 23 | 29 | 40 | 25 | 45 | 48 | 59 | 47 |

1.STANDARD APPLICABLE
As per IEC:433/DIN:48006 Part - 1/IS:731
2.COUPLING SIZE
As per IEC:120/DIN:48059/ IS:2486 Part-II
3.SHED PROFILE
As per IEC:60815

ABOVE DESIGN CAN ALSO BE SUPPLIED WITH CLEVIS CAPS ON REQUEST

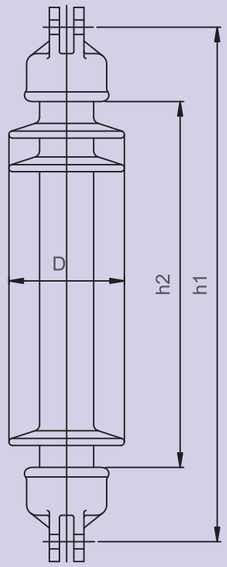
SUBJECT TO TECHNICAL CHANGES

Glaze : - Brown / Grey
Fitting :- MCI/SGI
(Hot Dip Galvanized)
Cement :- Portland/Lead Antimony

# LONG ROD INSULATORS
# CLEVIS TYPE (SINGLE UNIT)

STRENGTH - 70/120 KN

| TYPE | DIN DESIGNATION | LG60/6A/468 | LG60/7A/538 | LG60/8B/567 | LG60/13A/743 | LG60/8E/868 | LG60/15A/888 | LG75/9E/885 | LG60/16A/1268 |
|---|---|---|---|---|---|---|---|---|---|
| | IEC DESIGNATION | | L 70 CE 310 | L 70 CE 380 | | | | | L 90 CE 1000 |
| Drawing No. | | 111-C-141 | 111-C-004 | 111-C-187 | 111-C-068 | 111-C-266 | 111-C-144 | 111-C-301 | 111-C-307 |
| Spacing ( h1 ) mm. | | 468 | 538 | 567 | 743 | 868 | 888 | 885 | 1268 |
| Cermaic length between caps ( h2) mm. | | 285 | 355 | 384 | 560 | 685 | 705 | 679 | 1085 |
| Min. nominal creepage distance (mm.) | | 850 | 650 | 1120 | 1460 | 1850 | 1850 | 1850 | 1960 |
| Largest shed dia ( D ) mm. | | 170 | 120 | 175 | 150 | 160 | 160 | 175 | 130 |
| Type of shed ( Ref. page No. 6 ) | | A | A | B | A | E | A | E | A |
| Mechanical failing load (Tension) | kN | 80 | 80 | 90 | 90 | 80 | 80 | 120 | 90 |
| Routine test load ( Tension ) | kN | 64 | 64 | 72 | 72 | 64 | 64 | 96 | 72 |
| Wet P.F. withstand voltage | kV(rms) | 75 | 90 | 95 | 140 | 160 | 160 | 140 | 230 |
| Impulse withstand voltage | kVp | 170 | 210 | 250 | 325 | 350 | 350 | 350 | 550 |
| Visible discharge voltage | kV(rms) | 27 | 27 | 27 | 55 | 55 | 55 | 55 | 88 |
| Connecting bolt size | mm. | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 |
| Net weight ( approx. ) | kgs. | 12 | 10 | 13 | 16 | 19 | 20 | 24 | 21 |




| TYPE | DIN DESIGNATION | LG60/30A/1278 | LG75/19B/1265 | LG75/23A/1275 | LG60/22B/1323 | LG75/15F/1323 | LG85/26A/1465 | LG85/17E/1465 | LG85/30B/1610 |
|---|---|---|---|---|---|---|---|---|---|
| | IEC DESIGNATION | L90 CE 1000 | L 120 CE 1000 | L120 CE 1000 | - | - | - | - | - |
| Drawing No. | | 111-C-067 | 111-C-308 | 111-C-120 | 111-C-039 | 111-C-278 | 111-C-040 | 111-C-155 | 111-C-326 |
| Spacing ( h1 ) mm. | | 1278 | 1265 | 1275 | 1323 | 1323 | 1465 | 1465 | 1610 |
| Cermaic length between caps ( h2) mm. | | 1095 | 1059 | 1070 | 1105 | 1134 | 1237 | 1237 | 1358 |
| Min. nominal creepage distance (mm.) | | 2950 | 1960 | 2900 | 2630 | 4000 | 3200 | 4300 | 3212 |
| Largest shed dia ( D ) mm. | | 135 | 145 | 175 | 155 | 200 | 180 | 205 | 170 |
| Type of shed ( Ref. page No. 6 ) | | A | B | A | B | F | A | E | B |
| Mechanical failing load (Tension) | kN | 90 | 120 | 120 | 70 | 90 | 120 | 120 | 90 |
| Routine test load ( Tension ) | kN | 72 | 96 | 96 | 56 | 72 | 96 | 96 | 72 |
| Wet P.F. withstand voltage | kV(rms) | 230 | 230 | 230 | 275 | 275 | 275 | 275 | 275 |
| Impulse withstand voltage | kVp | 550 | 550 | 550 | 650 | 650 | 650 | 650 | 550 |
| Visible discharge voltage | kV(rms) | 88 | 88 | 88 | 105 | 105 | 105 | 105 | 105 |
| Connecting bolt size | mm. | 19 | 19 | 19 | 19 | 19 | 19 | 19 | 19 |
| Net weight ( approx. ) | kgs. | 23 | 29 | 40 | 25 | 45 | 48 | 59 | 47 |

1.STANDARD APPLICABLE
As per IEC:433/DIN:48006
Part - 1/IS:731

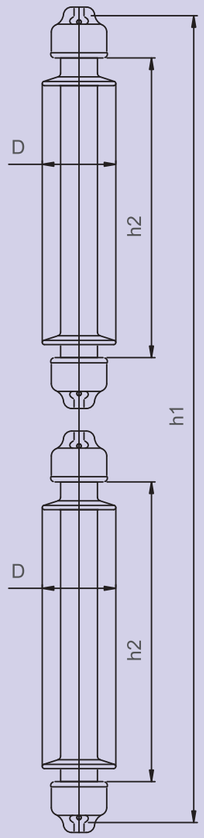
2.COUPLING SIZE
As per IEC:471/DIN:48073

3.SHED PROFILE
As per IEC:60815

Glaze : - Brown / Grey
Fitting :- MCI/SGI
(Hot Dip Galvanized)
Cement :- Portland/Lead Antimony

ABOVE DESIGN CAN ALSO BE SUPPLIED WITH BALL & SOCKET CAPS ON REQUEST

SUBJECT TO TECHNICAL CHANGES




# LONG ROD INSULATORS
# BALL & SOCKET TYPE (DOUBLE UNIT)

STRENGTH - 70/160 KN

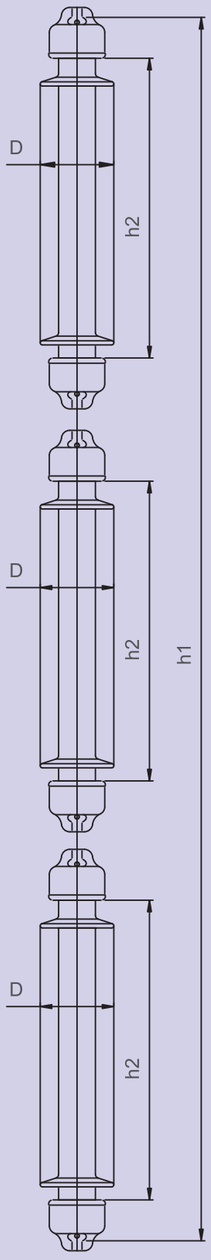
| TYPE | DIN DESIGNATION | 2LP 60/16A/910 | 2LP75/17A/1060 | 2LP75/10F/993 | 2LP75/11F/1065 | 2LP/60/18B/954 | 2LP75/19B/1022 | 2LP75/23B/1209 |
|---|---|---|---|---|---|---|---|---|
| | IEC DESIGNATION | - | 2L 120 BE 820 | 2L 120BE 820 | 2L 120 BE820 | - | - | - |
| Drawing No. | | 111-C-041(2) | 111-C-042(2) | 111-C-167(2) | 111-C-168(2) | 111-C-311(2) | 111-C-312(2) | 111-C-317(2) |
| Spacing ( h1 ) mm. | | 1885 | 2165 | 2030 | 2175 | 2030 | 2175 | 2550 |
| Cermaic length between caps (2Xh2) mm. | | 1490 | 1740 | 1604 | 1748 | 1571 | 1662 | 1982 |
| Min. nominal creepage distance (mm.) | | 3900 | 4200 | 6125 | 6450 | 4500 | 5060 | 7130 |
| Largest shed dia ( D ) mm. | | 150 | 165 | 210 | 210 | 160 | 185 | 215 |
| Type of shed ( Ref. page No. 6 ) | | A | A | F | F | B | B | B |
| Mechanical failing load (Tension) | kN | 90 | 120 | 120 | 120 | 70 | 120 | 160 |
| Routine test load ( Tension ) | kN | 72 | 96 | 96 | 96 | 56 | 96 | 128 |
| Wet P.F. withstand voltage | kV(rms) | 400 | 460 | 460 | 460 | 460 | 460 | 460 |
| Impulse withstand voltage | kVp | 900 | 1050 | 1050 | 1050 | 1050 | 1050 | 1050 |
| Visible discharge voltage | kV(rms) | 154 | 154 | 154 | 154 | 154 | 154 | 154 |
| Coupling size | mm. | 16 | 20 | 20 | 20 | 16 | 20 | 20 |
| Net weight ( approx. ) | kgs. | 38 | 54 | 74 | 74 | 44 | 68 | 112 |

ABOVE DESIGN CAN ALSO BE SUPPLIED WITH
CLEVIS CAPS ON REQUEST

SUBJECT TO TECHNICAL CHANGES

1.STANDARD APPLICABLE
As per IEC:433/DIN:48006
Part - 1/IS:731
2.COUPLING SIZE
As per IEC:120/DIN:48059/
IS:2486 Part-II
3.SHED PROFILE
As per IEC:60815

Glaze : - Brown / Grey
Fitting :- MCI/SGI
(Hot Dip Galvanized)
Cement :- Portland/Lead Antimony




## LONG ROD INSULATORS
## BALL & SOCKET TYPE (THREE UNIT)

STRENGTH - 120/320 KN

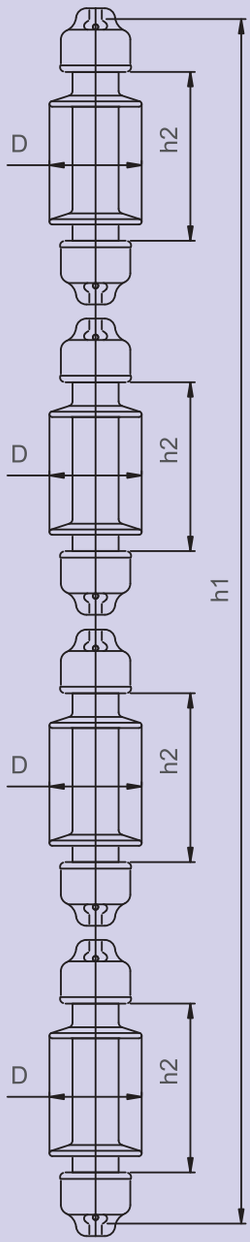
| TYPE | DIN DESIGNATION | 3LP75/13F/1185 | 3LP75/21B/1316 | 3LP85/23B/1258 | 3LP75/19B/1039 | 3LP85/23B/1231 | 3LP115/12E/1214 | 3LP95/13E/1217 |
|---|---|---|---|---|---|---|---|---|
| | IEC DESIGNATION | - | - | L 160 BE 1000 | - | - | - | - |
| Drawing No. | | 111-C-159(3) | 111-C-188(3) | 111-C-280(3) | 111-C-319(3) | 111-C-321(3) | 111-C365(3) | 111-C-376(3) |
| Spacing ( h1 ) mm. | | 3645 | 4080 | 3910 | 3335 | 3910 | 3900 | 3910 |
| Cermaic length between caps ( 3Xh2) mm. | | 2982 | 3375 | 3201 | 2544 | 3054 | 2841 | 2916 |
| Min. nominal creepage distance (mm.) | | 10500 | 8300 | 10500 | 7245 | 7590 | 2700 | 8510 |
| Largest shed dia ( D ) mm. | | 195 | 175 | 210 | 180 | 170 | 220 | 205 |
| Type of shed ( Ref. page No. 6 ) | | F | B | B | B | B | E | E |
| Mechanical failing load (Tension) | kN | 120 | 160 | 160 | 120 | 160 | 320 | 210 |
| Routine test load ( Tension ) | kN | 96 | 128 | 128 | 96 | 128 | 256 | 168 |
| Wet P.F. withstand voltage | kV(rms) | 680 | 690 | 680 | 680 | 680 | 680 | 680 |
| Impulse withstand voltage | kVp | 1550 | 1700 | 1550 | 1550 | 1550 | 1550 | 1550 |
| Switching surge withstand voltage | kVp | 1050 | 1050 | 1050 | 1050 | 1050 | 1050 | 1050 |
| Corona extension voltage | kV(rms) | 320 | 320 | 320 | 320 | 320 | 320 | 320 |
| Coupling size | mm. | 20 | 20 | 20 | 20 | 20 | 24 | 24 |
| Net weight ( approx. ) | kgs. | 120 | 108 | 153 | 102 | 123 | 210 | 159 |

ABOVE DESIGN CAN ALSO BE SUPPLIED WITH
CLEVIS CAPS ON REQUEST

SUBJECT TO TECHNICAL CHANGES

1.STANDARD APPLICABLE
As per IEC:433/DIN:48006
Part - 1/IS:731
2.COUPLING SIZE
As per IEC:120/DIN:48059/
IS:2486 Part-II
3.SHED PROFILE
As per IEC:60815

Glaze : - Brown / Grey
Fitting :- MCI/SGI
(Hot Dip Galvanized)
Cement :- Portland/Lead Antimony




# LONG ROD INSULATORS
# BALL & SOCKET TYPE (FOUR UNIT)

STRENGTH - 210/420 KN

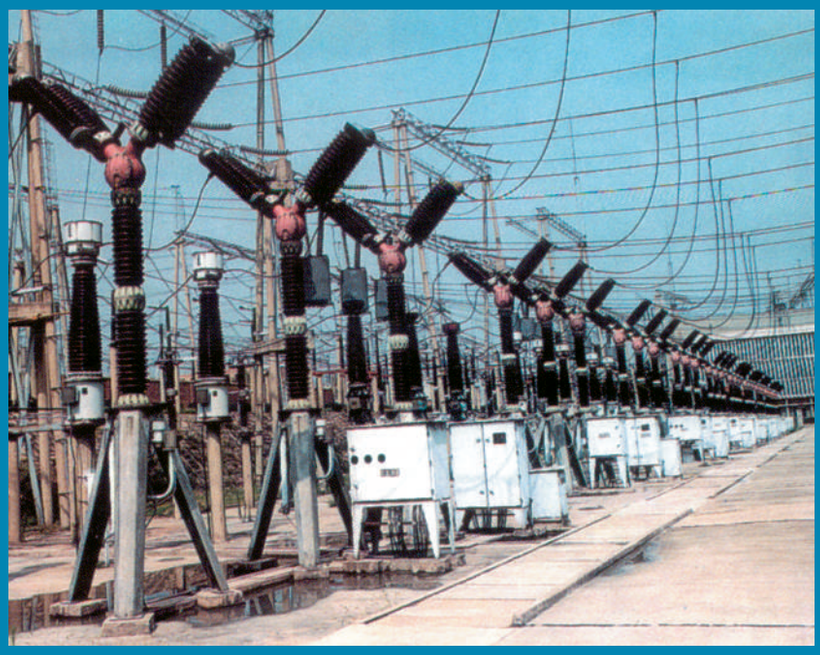
| TYPE | DIN DESIGNATION | 4LP95/16E/1345 | 4LP115/15E/1396 |
|---|---|---|---|
| | IEC DESIGNATION | - | - |
| Drawing No. | | 111-C-364(4) | 111-C-395(4) |
| Spacing ( h1 ) mm. | | 6025 | 5949 |
| Cermaic length between caps (4Xh2) mm. | | 4756 | 4476 |
| Min. nominal creepage distance (mm.) | | 12960 | 15225 |
| Largest shed dia ( D ) mm. | | 195 | 235 |
| Type of shed ( Ref. page No. 6 ) | | E | E |
| Mechanical failing load (Tension) | kN | 210 | 420 |
| Routine test load ( Tension ) | kN | 168 | 336 |
| Wet P.F. withstand voltage | kV(rms) | 850 | 850 |
| Impulse withstand voltage | kVp | 2400 | 2400 |
| Switching surge withstand voltage | kVp | 1550 | 1550 |
| Corona extension voltage | kV(rms) | 510 | 510 |
| Coupling size | mm. | 20 | 28 |
| Net weight ( approx. ) | kgs. | 228 | 344 |

ABOVE DESIGN CAN ALSO BE SUPPLIED WITH CLEVIS CAPS ON REQUEST

SUBJECT TO TECHNICAL CHANGES

1.STANDARD APPLICABLE
As per IEC:433/DIN:48006 Part - 1/IS:731
2.COUPLING SIZE
As per IEC:120/DIN:48059/ IS:2486 Part-II
3.SHED PROFILE
As per IEC:60815

Glaze : - Brown / Grey
Fitting :- MCI/SGI (Hot Dip Galvanized)
Cement :- Portland/Lead Antimony



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