# INITERGY... THE ESSENCE OF LIFE



AN ISO 9001:2008 & ISO 14001:2004 CERTIFIED COMPANY





Modern Group is one of the leading textile and engineering multi-product Industrial Group in India. Modern Group of Industries emerged on the corporate scene in 1976 - 77 and is managed by very dynamic and professional entrepreneur Mr. H. S. Ranka and his team with a vision of High Quality products. Modern Group is having five manufacturing units in the states of Gujarat and Rajasthan with manpower base of about 7000 employees and sales turnover exceeding 300 Million US\$. The Group has made significant achievements in export and is further spearheading its efforts to achieve commendable export share in the coming years.

#### **MODERN INSULATORS**

MIL has been set up by the Modern Group in 1985 with technical collaboration from Siemens AG, Germany, for manufacture of High Voltage Porcelain Insulators for Transmission lines, Substations, Railways and Hollow porcelain for Measurement & Protection Equipments.

CAPEXIL a government of India body recognises MIL efforts in exports by frequently awarding prestigious top export awards.







ISO 14001:2004



ISO 9001:2000

# **Hollow Porcelain Insulators**



Modern Insulators Limited (MIL) was mainly started for manufacture of high strength alumina porcelain insulators required for high voltage and extra high voltage equipments.

MIL manufactures wide range of high voltage alumina porcelain insulators for use in high voltage SF6 circuit breakers, current & potential transformers and lightning arresters. MIL enjoys a major share in the market for hollow porcelain insulators for SF6 circuit breakers and is preferred supplies for switchgear manufacturers like ABB, GE, BHEL, Crompton Greaves, Siemens and other manufacturers. MIL not only caters to the domestic segment but is also a preferred supplier for overseas divisions of ABB, GE, Siemens & other OEMs.



MIL has specialized equipments for manufacture of extra-large sized hollow porcelains for high voltage equipments and their trained engineers and technicians can ensure correct designs, manufacturing techniques & quality levels ensuring consistent reliability in performance. The details of the range of insulators which can be manufactured with the facilities available with MIL are furnished in the annexure I.

MIL has excellent facilities for testing of hollow insulators for various applications. Metal parts of Aluminum or Spheroidal Graphite Iron used for assembly are manufactured in-house in the foundry divisions of MIL.



The cementing method is adopted as per guidelines given by Siemens who were the collaborators of Modern Insulators. Cement used is of special quality portland cement collected from Silos and stored in container without scope of contamination and put into use within the specified period. The cement undergoes tests before it is cleared for assembly. The established practices of applying bitumen on the inside surface of the metal parts and outside of porcelain sanded portion, providing cork, adoption of proper curing methods are all meticulously followed in the manufacture of assembled insulators. The hollow insulators are assembled in precision jigs ensuring parallelism and concentricity.

# **Hollow Porcelain Insulators**

The in-house routine and acceptance test as per relevant standards in the presence of the customers ensure consistent reliability in supplies. MIL possesses all facilities for testing of high strength, high pressure hollow insulators for SF6 circuit breakers as per relevant Indian and International standards and important tests like mechanical strength tests for support insulators, hydraulic pressure test for arc chambers etc., are also done regularly in presence of customers.

Besides, assembled hollow insulators are checked for all dimensions, correctness of the concentricity and parallelism of metal parts at top and bottom. They are also tested for routine electrical test, ultrasonic test, visual inspection and other tests strictly in conformity with the standards.

While Hollow porcelain insulators are tailor made as per customer requirements, guidance is provided on selection of suitable profiles on the basis of the polluted environmental requirements to ensure satisfactory performance.

Metal flanges are made of aluminium LM6/9/25 or SGI 400/15 duly anodized in case of aluminium and hot dip galvanised in case of SGI as specified by the customers.

The flanges are designed to the required depth with inside groove designs ensuring proper distribution of the mechanical forces to achieve guaranteed mechanical and pressure characteristics as per specifications.

MIL has supplied hollow porcelain insulators with creepage distances up to 35mm/kV for important projects in India & abroad.

MIL hollow porcelain insulators are supplied on annual contract basis to leading switchgear manufacturers like ABB, GE, Siemens, Crompton Greaves, BHEL and others for their Domestic & Overseas requirements.

Hollow porcelains for support insulators are with cylindrical bore and for arcing chambers with taper & barrel type bore for high pressure requirements. A wide range of hollow porcelains of different outside diameters, wall thickness, inside bore, height, creepage distance are being supplied for different manufacturers for HT breakers, CT/CVTs, Lightening arrestors and cable terminators.

MIL has an excellent track record of performance of these hollow porcelain insulators.







# **Hollow Porcelain Insulators**







#### **Annexure I**

### **MANUFACTURING CAPABILITIES**

### Option I (for type A B C D E F)

1.	Bore min. mm (d)	165
	Bore max. mm (d)	425
2.	Height max. mm (H)	2800
3.	O.D. max. mm (D)	650

#### Option II (for type A B C D E F)

1.	Bore min. mm (d)	105
	Bore max. mm (d)	270
2.	Height max. mm (H)	2200
3.	O.D. max. mm (D)	425

### Option III (for type A B E F)

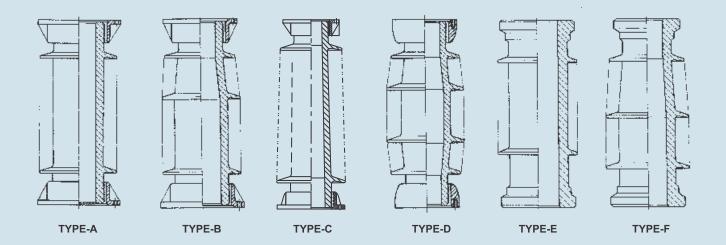
1. Bore min. mm (d)	50
Bore max. mm (d)	200
2. Height max. mm (H)	2150
3. O.D. max. mm (0)	400

### **ORDERING INFORMATION**

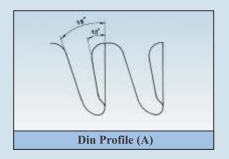
- 1. Height & tolerances
- 2. ID of Insulator with profile if any.
- 3. Creepage distance requirement
- 4. Mechanical strength (Cantilever / pressure test) requirement if any.
- 5. End fixing arrangement with collar dimensions if any
- 6. If assembled insulator details of fixing PCD arrangement with drg.
- 7. Flange to porcelain depth. & 'O' Ring dimension
- 8. Specific requirement if any like shape type of shed etc.

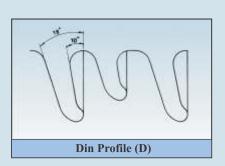
<sup>\*</sup>If possible drg. of insulator and critical dimension to be given

# **Type of Insulators**

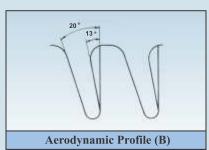


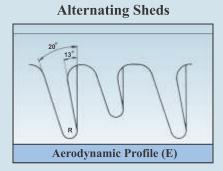
### **Shade Profile**

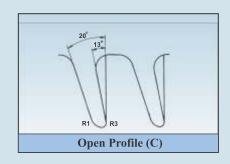


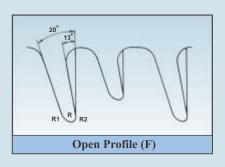


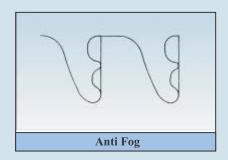
### **Normal Sheds**

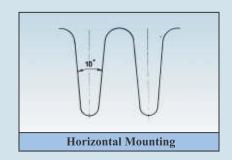












Standards: IEC: 60815

# **Pollution Severity Levels**

Pollution Level	Examples Of Typical Environments	Minimum Specific Creepage Distance mm/kV
I Light	<ul> <li>Areas without industries and with Low density of houses equipped heating plants.</li> <li>Areas with low density of industries or houses but subjected to frequent winds and or rainfall.</li> <li>Agricultural areas. Mountainous areas         All these areas shall be situated at the least 10 to 20 km from the sea and shall not be exposed to winds directly from the sea.     </li> </ul>	16
II Medium	<ul> <li>Areas with industries not producing particularly polluting smoke and/or with average density of houses equipped with heating plants.</li> <li>Areas with high density of houses and / or industries but subjected to frequent winds and or rainfall.</li> <li>Areas exposed to wind from the sea but not too close to the coast (at least several kilometers distant)</li> </ul>	20
III Heavy	<ul> <li>Areas with high density of industries and suburbs of large cities with high density of heating plants producing pollution.</li> <li>Areas close to the sea or in any case exposed to relatively strong winds from the sea</li> </ul>	25
IV Very heavy	<ul> <li>Areas generally of moderate extents, subjected to conductive dusts and to industrial smoke producing particularly thick conductive deposits.</li> <li>Areas generally of moderate extent, very close to the coast and exposed to sea spray or to very strong &amp; polluting winds from the sea</li> <li>Desert areas characterized by no rain for long periods, exposed to strong winds carrying sand, and salt and subjected to regular condensation.</li> </ul>	31

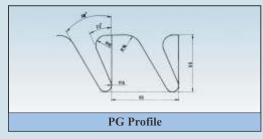
The values of the creepage distance obtained must be increased by a factor  $\mathbf{k}_D$  where  $\mathbf{D}_m$  is the average diameter

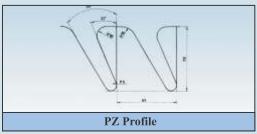
Regular sheds Dm = 
$$\frac{De + Di}{2}$$

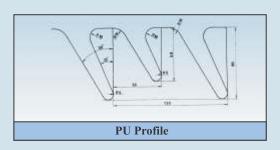
Dm < 300 mm: kD = 1  $300 \le Dm \le 500 \text{ mm}: kD = 1.1$ Dm > 500 mm: kD = 1.2

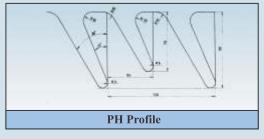
Alternating sheds Dm =  $\frac{\text{Del} + \text{De2} + 2\text{Di}}{4}$ 

### **ENEL Profiles**









# **Dimensional Tolerance**

# Dimensional tolerance applicable for hollow porcelain

Due to the inherent nature of raw materials used & the effect of climatic conditions on the manufacturing process there exists a certain degree of variation in the final product even with the best quality control practices being adopted. This has been universally recognized & accepted and accordingly national & international standards also permit tolerances for the various dimensions.

# These Dimensional tolerance are classified as given below:

- General tolerances
- Parallelism and Lean of ground portions
- Diameter tolerances of upper and lower ends
- Ovality of inside and outside diameters
- Tolerance of wall thickness
- Warpage of centre line
- Tilt of shed, sand band and clamping part
- Tolerance of ground portions
- Finish of ground surfaces

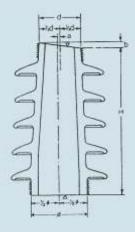
#### **General Tolerances**

Nominal Din	nension	General Tolerance
mm		mm
more than 0	up to 20	±1.5
20	30	2.0
30	40	2.0
40	50	2.5
50	60	3.0
60	70	3.5
70	80	3.5
80	100	4.0
100	125	5.0
125	150	6.0
150	200	7.0
200	250	8.0
250	300	9.0
300	350	10.0
350	400	11.0
400	450	12.0
450	500	13.0
500	600	14.0
600	700	16.0
700	800	17.0
800	900	18.0
900	1,000	20.0
1,000	1,200	24.0
1,200	1,400	28.0
1,400	1,600	32.0
1,600	1,800	36.0
1,800	2,000	40.0
2,000	2,500	50.0
2,500	-	2%

Notes: 1. These tolerances are not applied to the height of ribs or the interval of sheds.

2. Tolerance on creepage distance will be as per IEC standards.

### Parallelism and Lean of Ground Portion

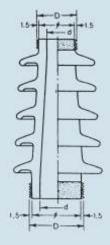


	l Height H, nm	Lean, a mm	Parallelism, b mm
more than 0	up to 200	0.5	0.4
200	300	0.8	0.4
300	400	1.0	0.4
400	500	1.3	0.4
500	600	1.5	0.4
600	700	1.8	0.4
700	800	2.0	0.4
800	900	2.3	0.4
900	1,500	2.5	0.4
1,500	2,800	3.0	0.4
2,800		4.0	0.4

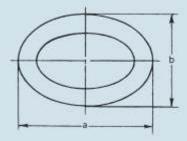
Standards Applicable IEC: 233, 1264 & IS: 5621

# **Dimensional Tolerance**

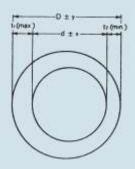
# **Diameter Tolerance of Upper and Lower Ends**



# **Ovality of Inside and Outside Diameters**



# **Tolerance of Wall Thickness**



Nominal Dimen mm	Tolerance mm	
more than 0	up to 50	±2.0
50	75	2.5
75	100	3.0
100	125	3.5
125	150	4.0
150	175	4.5
175	200	5.0
200	250	5.5
250	300	6.0
300	350	7.0
350	400	8.0
400	500	9.0
500	600	11.0
600	700	13.0
700	800	15.0
800	900	17.0
900	1,000	19.0
1,000		2%

Notes: The general tolerance is applied unless above tolerances are indicated on the drawing.

Nominal Dimer	Nominal Dimension D & d mm		
more than 0	up to 50	2.0	
50	75	2.5	
75	100	3.0	
100	125	3.5	
125	150	4.0	
150	175	4.5	
175	200	5.0	
200	250	5.5	
250	300	6.0	
300	350	7.0	
350	400	8.0	
400	500	9.0	
500	600	11.0	
600	700	13.0	
700	800	15.0	
800	900	17.0	
900	1,000	19.0	
1,000		2%	

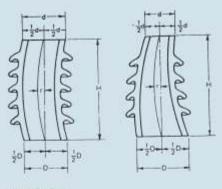
Nominal V Thickness, mm		Tolerance of wall Thickness mm	Differential of Wall Thickness (tl-t2) mm
more than 0	up to 10	+a	1.5
		-1.5	
10	15	+a	2.0
		-2.0	
15	20	+a	2.5
	2.5	-3.0	2.0
20	25	+a	3.0
25	20	-3.5	2.5
25	30	+a	3.5
30	40	-4.0 +a	4.0
30	40	+a -4.5	4.0
40	55	-4.3 +a	4.5
40	33	-5.0	7.5
55	70	+a	5.0
	70	-6.0	3.0

Notes: 1. These tolerances are not applied to ground wall
2. Plus side tolerance "a" is determined by the following equation:

x, y: diameter tolerances of D and d respectively.

# **Dimensional Tolerance**

# **Warpage of center line**

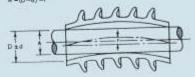


#### **Rod Gaging**

Case 1 When centering with porcelain are required  $A = (D-d) = 2\tau$ 



Case 2 When centering not required A =(D-d) =i



where D: diameter of bore

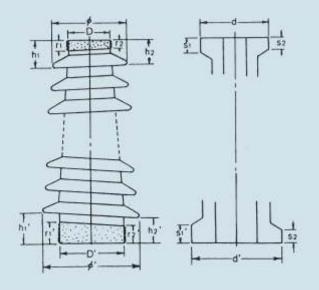
d: general torelance of diameter of bore

r : warpage of center line

A: diameter of rod gage

Nominal	Height, H	Warpage Of Center Line, r mm		
mm		H <sub>D</sub> <2	2< H/2 <3	3< H D
more than 0	up to 50	1.0	1.0	1.5
50	70	1.2	1.2	1.5
70	100	1.5	1.5	2.0
100	200	2.0	2.0	3.0
200	300	3.0	3.0	4.0
300	400	4.0	4.0	5.0
400	500	4.0	4.5	6.0
500	600	4.5	5.0	6.5
600	700	5.0	6.0	7.0
700	800	5.0	6.0	8.0
800	900	5.5	7.0	9.0
900	1,000	5.5	7.0	9.0
1,000	1,100	6.0	8.0	10.0
1,100	1,200	6.0	8.0	10.0
1,200	1,300	7.0	9.0	11.0
1,300	1,400	8.0	10.0	12.0
1,400	1,500	9.0	11.0	13.0
1,500	1,800	10.0	12.0	14.0
1,800	2,100	11-0	13.0	15.0
2,100	2,400	12-0	14.0	16.0
2,400	2,700	13.0	15.0	17.0
2,700	3,000	18.0		
3,000	3,500	20.0		
3,500	4,000	22.0		
4,000	4,500	24.0		
4,500		0.8%		

### Tilt of shed, sand band and clamping part

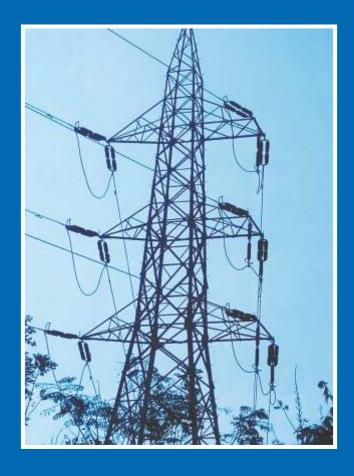


Nominal Diam	eter 0, 0, D, D', d or d'	Tilt of Shed, Sand Band and Clamping part mm	
more than 0	up to 100	4.0	
100	200	5.0	
200	250	6.0	
250	300	7.0	
300	350	8.0	
350	400	8.0	
400	450	9.0	
450	500	10.0	
500	525	11.0	
525	550	12.0	
550	575	13.0	
575	600	14.0	
600	700	15.0	
700	800	16.0	
800	900	17.0	
900	1,000	18.0	
1,000	1,200	19.0	

Note: Tilt of shed - hl(max.) -h2 (min.) or -h'l (max.) -h'2 (min.) Tilt of sand band -rl(max.) -r2 (min.) or -rl' (max.) -r2' (min.) Tilt of clamping part -sl(max.) -s2 (min.) or -s'l (max.) -s'2 (min.)

Standards Applicable IEC: 233, 1264 & IS: 5621







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