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General Information for Insulators

Rated insulation levels for post insulators

Um kV	Rated power frequency withstand voltage acc.to IEC 60273 kV	Impulse voltage kV peak
3.6	10	40
7.2	28	60
12	38	75
17.5	50	95
24	50	125
36	70	170

Um:Maximum Voltage for Equipment

Starting torques

Threads	Nominal value Nm	max. Nm	min. Nm
M6	6.4	7.7	5.1
M8	15	18	12
M10	32	38.4	25.6
M12	45	54	36
M16	110	132	88
M20	220	264	176
M24	295	345	245

Conductor diameters for bushings

Current ratings	Conductor diameter mm (Cu)	Rated current A	Short time current for Cu-conductor 1th kA	Rated dynamic current Idyn kA
250A to 1250A	12	250	13.5	34
	16	400	18	45
	20	630	28	70
	24	800	36	77.5
	30	1250	57	143

Post Insulators for Indoor Use



Application

Indoor post insulators of cast resin can be used for all indoor plants, also in the tropics. They are suitable for temperatures from $-25\text{ }^{\circ}\text{C}$ to $+90\text{ }^{\circ}\text{C}$.

Construction

Indoor post insulators of cast resin are cylindrical solid insulators. The main dimensions and mechanical requirements are in accordance with IEC 60273-1990.

Tests

The following tests to IEC 60660-1999 are performed:

Type tests,

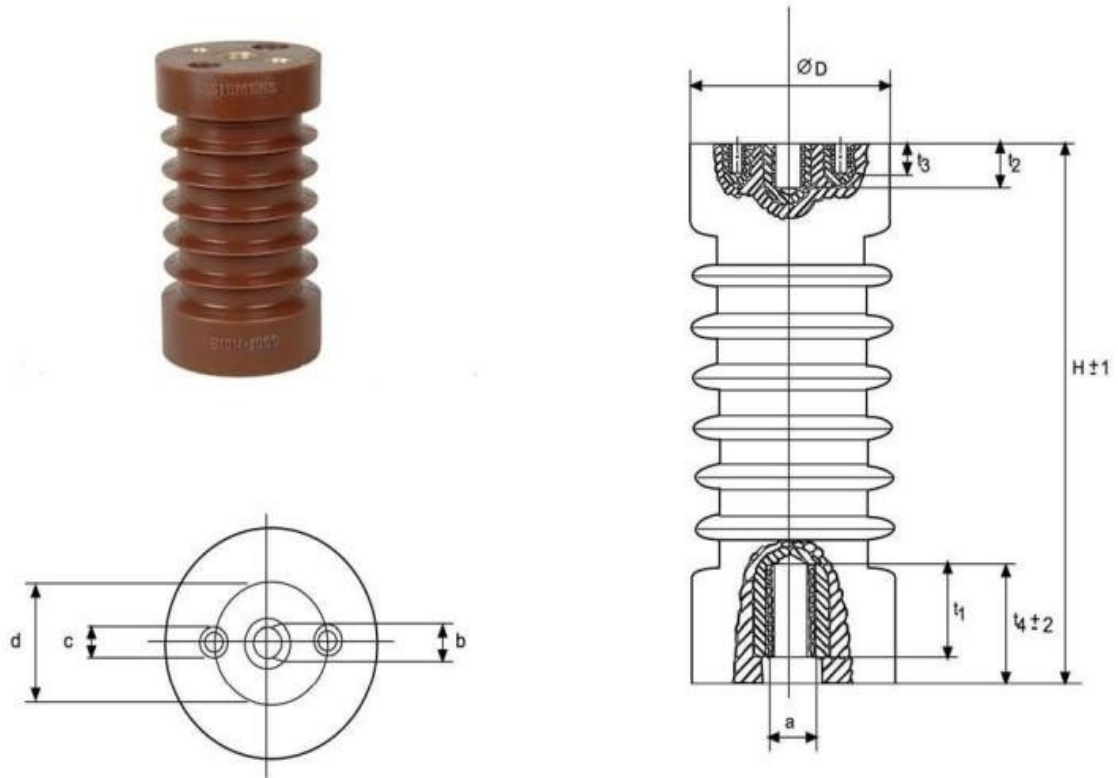
- Test with rated power-frequency withstand voltage (dry).
 - Test with rated lightning impulse withstand voltage.
- Testing of minimum failing loads (nominal loads) for;
Bending, tension, torsion

Routine tests,

- Visual inspection
- Dimensional inspection
- Testing of conductive connection of threaded fixing bushes.
- Partial discharge extinction voltage test.



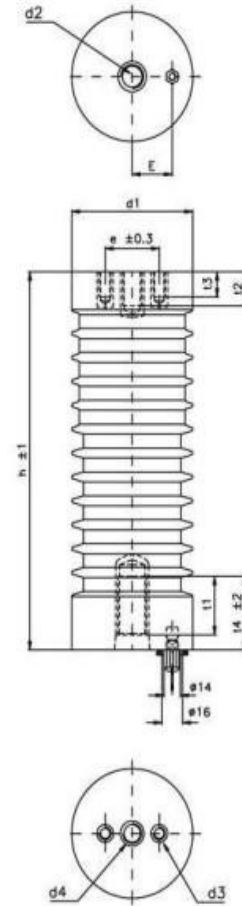
Post Insulators for Indoor Use



According to IEC 60273-1990, IEC 60660-1999, VDE 0674 (1993), VDE 0111 (1980)

Type (Acc. IEC)	Type (Acc. VDE)	Weight kg.	Um kV	Minimum bending N	Dimensions (mm)										Minimum creepage mm	Rippes	Packing pcs	
					H	d	D	a	b	c	t1	t2	t3	t4				
JO4-60	10S 500	0,43	7,2	5000	95	36	60	M12	M12	M6	15	15	14	30	130	3	15	
JO4-75	10N 500	0,60	12	5000	130	36	62	M16	M12	M6	24	15	14	36	160	5	9	
JO8-75	10N 1000	1,00		10000		46	80	M20	M16	M10	27	33	15	42				160
JO16-75	10N 1600	1,35	12	1600	130	64	91	M20	M16	M10	42	30	17	68	190	4	9	
JO4-95	15N 500	1	17.5	5000	175	36	70	M16	M12	M6	33	15	14	45	240	6	12	
JO8-95	15N 1000	1.52		10000		46	85	M20	M16	M10	27	33	15	46				240
JO4-125	20N 500	1,25	24	5000	210	36	74	M16	M12	M6	33	15	14	50	320	8	12	
JO8-125	20N1000	1.95		10000		46	86	M20	M16	M10	27	33	15	44				320
JO4-170	30N 500	1.86	36	5000	300	36	76	M16	M12	M6	33	15	14	54	435	11	6	
JO10-170	30N 1000	3.42		10000		46	99	M24	M16	M10	36	33	15	60				435
JO13-170	30N 1250	4.54		12500		46	115	M24	M16	M10	36	33	15	78				435

Voltage Divider Post Insulators



Application

Indoor voltage divider post insulators are used as the high voltage capacitance for the voltage divider of capacitance-coupled voltage indicating systems. The connection dimensions and heights of the indoor voltage divider post insulators are the same as those for standard post insulators. They are suitable for temperatures from -25 °C to +90 °C.

Construction

Indoor voltage divider post insulators are cast of epoxy resin. The main dimensions and mechanical requirements are in accordance with, DIN 48136, IEC 60273-(1990).

Tests

In addition to the tests applied to the standard post insulators according to VDE 0441 part 3 resp. IEC 60660-(1999) following routine tests are performed:

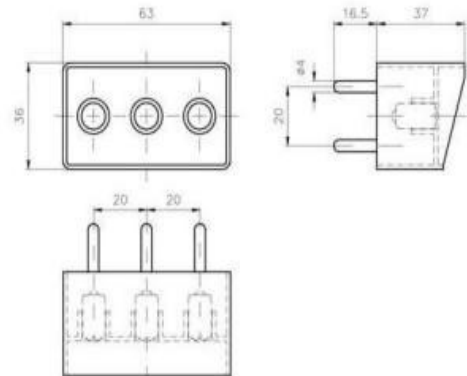
- Test with rated power frequency withstand voltage (dry).
- Partial discharge extinction voltage test
- Capacitance test

Type	Maximum voltage for equipment Um kV	Capacity ±10% pF	Minimum bending N	Minimum creepage distance mm	Rippes pcs	Approx. weight kg	Dimensions (mm)											Packing Pcs
							h	e	E	d1	d2	d3	d4	t1	t2	l3	t4	
KP-10N 500	12	50	5000	160	5	0,6	130	36	30	80	M16	M6	M12	17	20	17	20	9
KP-10N 1000	12	50	10000	160	5	1,00	130	46	30	80	M20	M10	M16	17	20	17	20	12
KP-15N 500	17.5	50	5000	240	6	1,00	175	36	30	85	M16	M6	M12	19	22	17	47	12
KP-15N 1000	17.5	50	10000	240	6	1,52	175	46	30	85	M20	M10	M16	19	22	17	47	8
KP-20N 500	24	50	5000	320	8	1,25	210	36	30	74	M16	M6	M12	35	20	14	47	12
KP-20N 1000	24	50	10000	320	8	1,95	210	46	30	86	M20	M10	M16	35	27	20	47	8
KP-30N 500	36	50	5000	435	11	1,86	300	36	34	82	M16	M6	M12	19	22	17	50	6
KP-30N 1000	36	50	10000	435	11	3,42	300	46	34	99	M24	M10	M16	36	21	17	57	3

Accessories for Capacitance -Coupled Voltage Indication



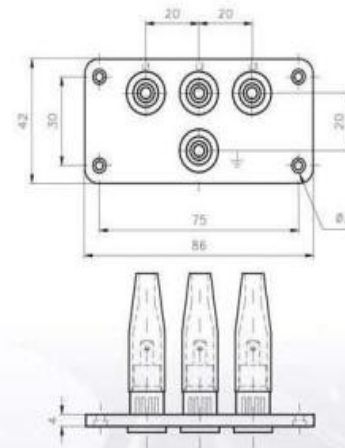
Voltage indicator VI-F



Technical data of voltage indicators

Type	VI-F
Rated frequency	50/60 Hz
Threshold voltage U_a	max. 90 V
Blinker frequency at U_a	1 Hz
Blinker at 230 V	Continuous
Maximum continuous voltage	1080 V
Rated power frequency withstand voltage	2 kV
Current consumption at indication voltage, r.m.s.	2.5 mA
Current consumption at 230 V	approx. 220 μ A
Protective System	IP42
Permissible ambient temperature	-25° to +55° C
Weight	50 gr.

Interface VI-P



Types of coaxial cable

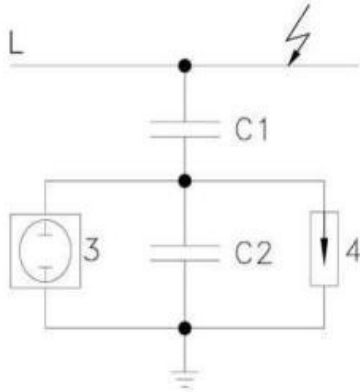
Type	L m	C pF	D Socket connection mm
KPK-3	3	303	4.8
KPK-6	6	606	4.8

Different lengths upon request

Coaxial cable to interface point with surge arrester



Capacitive Voltage Indicating Systems for Medium Voltage



- C1 = Capacitance of voltage divider post insulator
- C2 = Low-voltage capacitance of divider
- 3 = Voltage indicator
- 4 = Surge arrester

Capacitance-coupled voltage indication system

The voltage indication system consists essentially of a capacitive voltage divider between the conductor L and earth, an indicator and a surge diverter.

Function

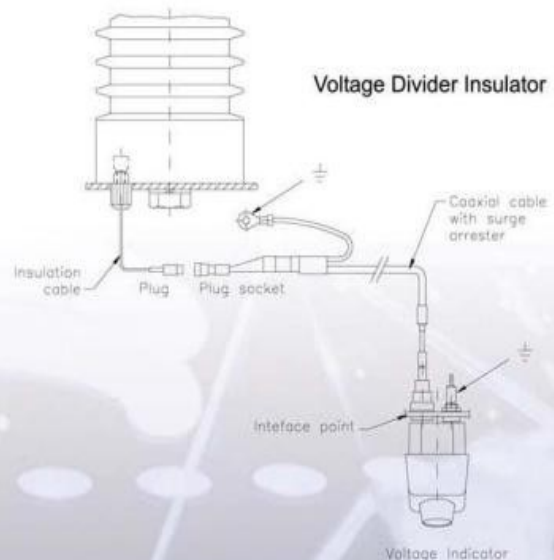
The voltage divider ratio should be selected so that:
Up to 10% of the rated voltage of the medium-voltage equipment there is no indication.

From 40% of the rated voltage of the medium-voltage equipment there is always an indication. The indicator, system HO contains a glow lamp which flashes when a voltage is being applied. The voltage is indicated separately for each conductor and independent from the other conductors. The system operates without a battery or auxiliary supply, drawing its energy from the high-voltage system. One indicator per conductor can be plugged into sockets directly on the front panel of the switchgear, which are connected via permanent conductors to the voltage divider post insulator.

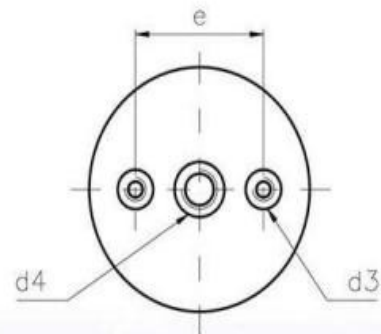
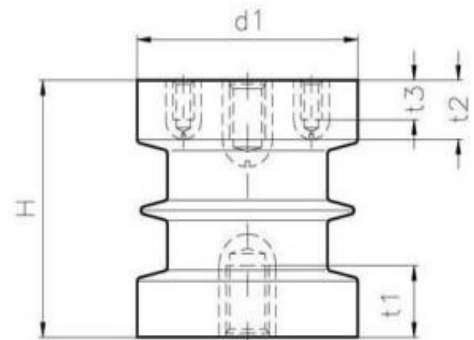
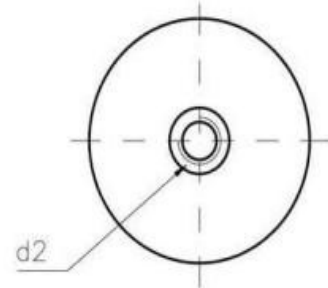
Shock-hazard protection

Persons are not at risk with the voltage indicating system, neither during normal nor during disturbed operation. During normal operation, the voltage divider capacitance C1 limits the possible currents to less than 100 μA . They remain clearly below these limit values, irrespective of whether the indicator is plugged in or not or whether the connection socket is earthed or not. In the event of the insulation being punctured, a surge diverter is provided at the connection of the divider capacitance C1 to prevent the high voltage from being transmitted to the low-voltage side. This operates within 0,05 ms and limits the voltage at the socket to approximately 20 V.

Connection diagram

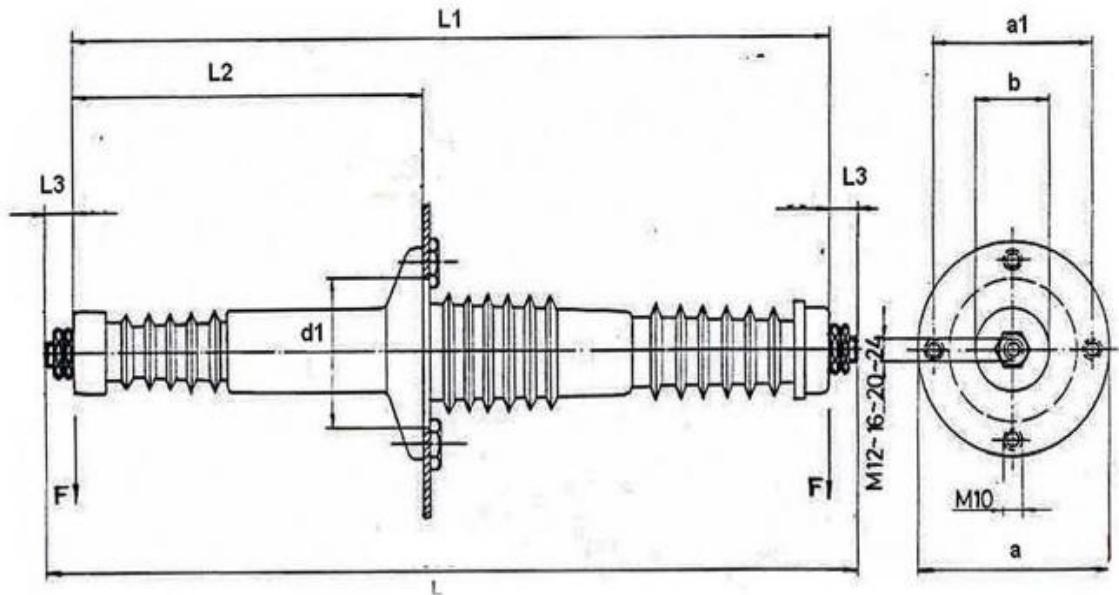


Low Voltage Post Insulators for Indoor Use



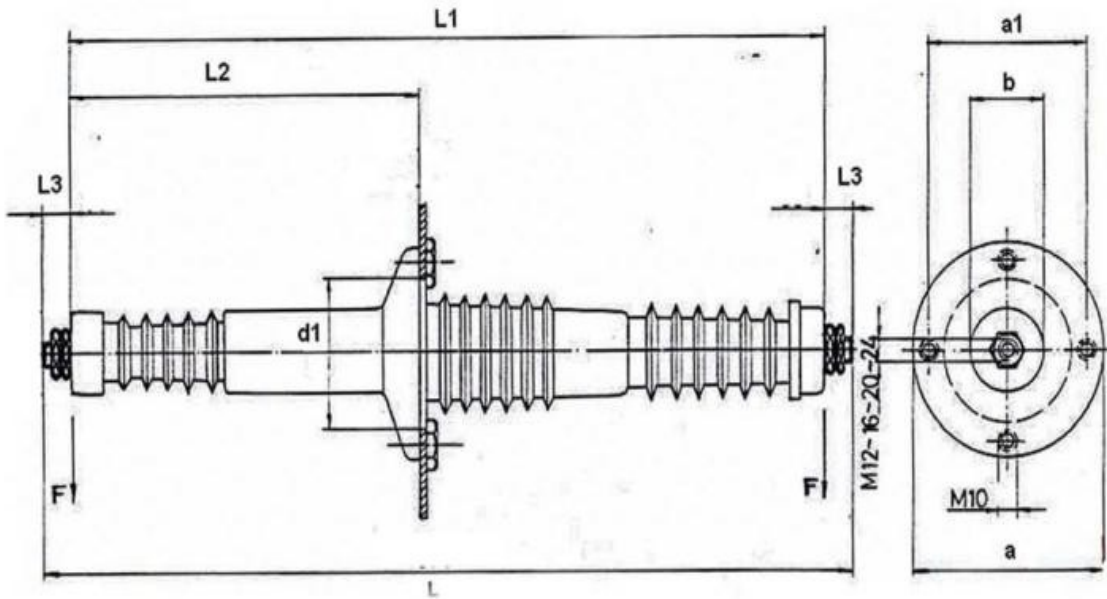
Type	Maximum voltage for equipment U_m	Minimum bending	Minimum creepage distance	Rippes	Approx. weight	Dimensions (mm)							Packing		
						H	e	d1	d2	d3	d4	t1		t2	t3
1N 500	1,2 kV	5000 N	80 mm	1	0,21 kg	60	-	54	M10	-	M10	17	17	-	72
1N 1000	3,6 kV	10000 N	131 mm	3	0,75 kg	80	36	84	M12	-	M16	24	20	17	24

Bolt Bushings For Indoor Use



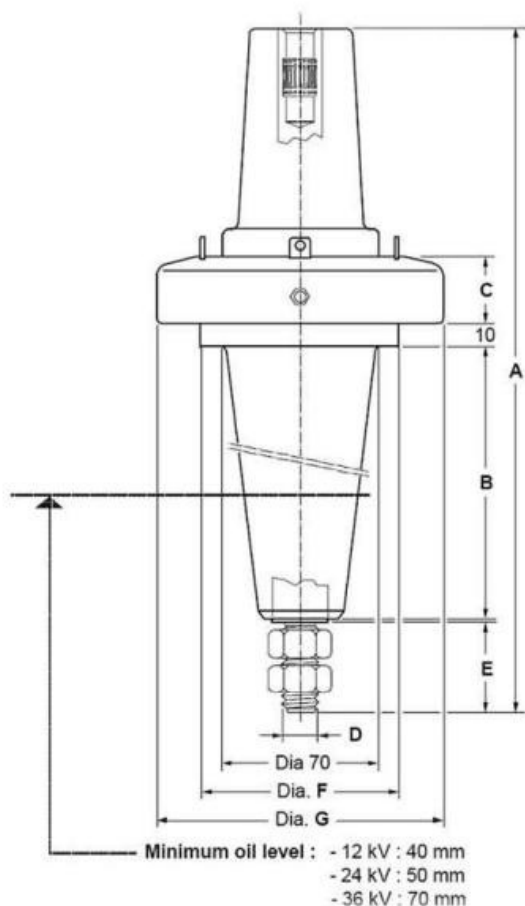
Type	Weight	Minimum bending (P _N)	U _m	Rated current	Dimensions (mm)								
	kg				N	kV	A	L	L ₁	L ₂	L ₃	a	a ₁
DDB-12	1.730	7500	12	100-250	485	375	170	55	130	114	55	75	
	2.175			400									
	2.640			630									
	3.520			800									
	5.955			1250	535			80					
DDB-24	3.170	7500	24	100-250	630	520	250	55	165	124	65	110	
	3.720			400									
	4.500			630									
	5.420			800									
	8.320			1250	680			80					
DDB-36	6.350	7500	36	100-250	830	720	360	55	180	146	75	125	
	7.000			400									
	8.500			630									
	9.350			800									
	12.500			1250	880			80					

Bolt Bushing for Indoor - Outdoor Use



Type	Weight kg	Minimum bending (PN)	Um kV	Rated Current A	Dimensions (mm)								
					L	L1	L2	L3	a	a1	b	d1	d
DHB-12	3,050	7500	12	100-250	515	405	170	55	130	114	55	75	M12
	3,550			400									M16
	4,250			630									M20
	5,060			800									M24
	7690			1250	565			80					Q 30
DHB-24	4,025	7500	24	100-250	665	555	250	55	165	124	65	110	M12
	4,610			400									M16
	5,420			630									M20
	6,330			800									M24
	9,290			1250	715			80					Q 30
DHB-36	8,690	7500	36	100-250	890	780	380	55	180	146	75	125	M12
	9760			400									M16
	10,850			630									M20
	12075			800									M24
	15,975			1250	940			80					Q 30

Bushing With Plug Connection



Up to 36 kV - 630 A

Application

For use in equipment insulated with oil fluid, typically for transformers, switchgear, capacitors...
System voltages of 12 kV, 24 kV and 36 kV for indoor and outdoor installations.
Mounting in vertical or horizontal position.

Design

Moulded epoxy insulated part in accordance with CENELEC EN 50180 and EN 50181

Specifications and Standards

EDE plug-in type equipment bushings meet the requirements of CENELEC EN 50180 and IEC 60137

Technical Characteristics

Each bushing is tested for industrial power frequency and partial discharge prior to leaving the factory

Ordering Instructions

Bushings will be supplied with an earth lead unless an earth plate is specified.
For bushings including an earth lead.

Equipment bushing type	Voltage U_r (kV)	Current I_r (A)	Dimensions mm.						
			A	B	C	D	E	Dia. F	Dia. G
EB12250	12	250	187	71	28	M10	22	74	110
EB24250	24	250	187	71	28	M10	22	74	110
EB36400	36	400	310	144	30	M12	22	87	127
EB36400 (S)	36	400	240	98	30	M12	22	87	127
EB24 / 36630	24 / 36	630	328	144	30	M12	40	87	127

Bushing With Plug Connection



12 / 24 / 36 KV
250 / 400 / 630 A
Bushing With Plug Connection

Cast Resin Terminals

Introduction

The terminal assemblies are a single piece oil-tight epoxide resin castings incorporating copper bar terminals for phase and neutral conductors. They are designed for flange being as specified in Fig.

Applications

The terminal assemblies are designed for use in oil/compound (3.6Kv) or air filled (1.1Kv) cable boxes. They are suitable for fitting on oil filled, Midel filled or Formal NF filled transformers and can also be used in air/air applications when required.

Specification

The cast resin bushing assemblies are capable of withstanding short circuits no less onerous than those the associated transformer. The assemblies are not adversely affected by continuous immersion in transformer oil complying with the requirements of standards at 105 °C. Each cast resin assembly is marked with an individual serial , number for identification.

The cast resin assembly has undergone type tests to verify the thermal stability comprising of an ambient temperature to – 10°C to + 105°C to ambiend temperature.

Routine tests consist of an air leakage test at 1 bar on the transformer side and the other side exposed to atmosphere.

At the conclusion of this test no leakage of air shall have occurred. The over voltage test requires for a withstand of 28kV for 1 minute between adjacent conductors and between conductors and earth.

Construction

The copper conductors are electro tinned and have fully radiused edges. The fixing of the cast resin insulators are identical but the profile may vary depending on the individual tools being used during the moulding process.

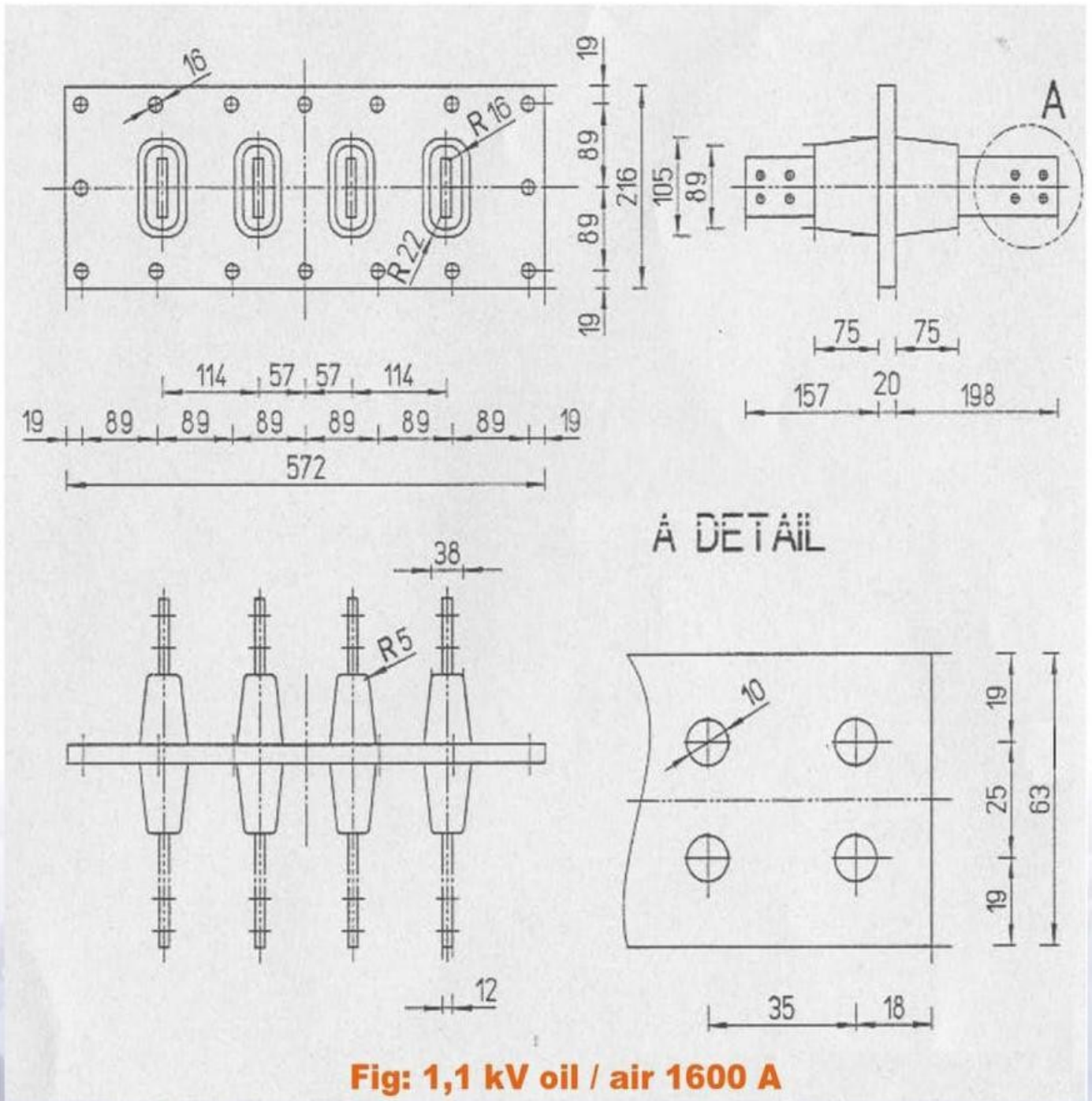


Fig: 1,1 kV oil / air 1600 A

Bushing With Plug Connection

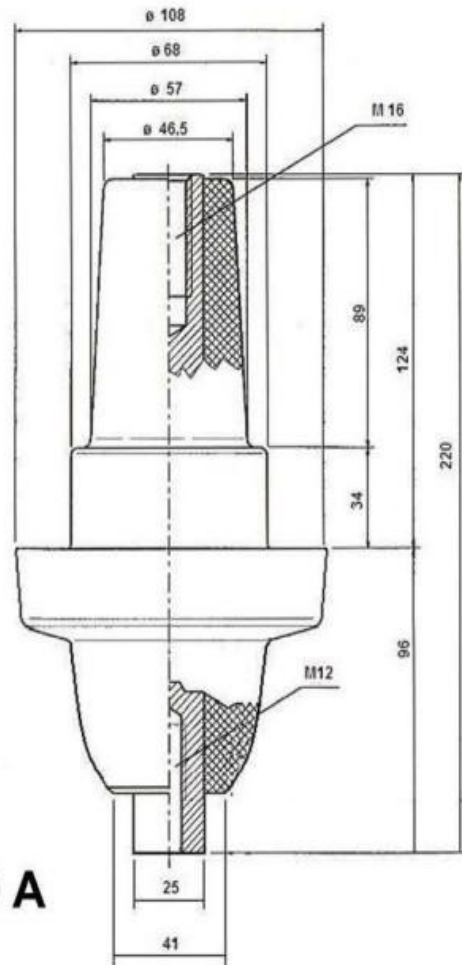


Fig: 400-630 A

CHARACTERISTICS

General Characteristics

The bushing can be used as a fixed part in the medium voltage inlet for oil or SF6 insulated devices, such as transformers or switchgears. It is equipped with a connection for the reading of L.V. by a light signal box.

Application

For indoor use, vertical and horizontal installation.

Technical Characteristics

Each bushing is tested for industrial power frequency and partial discharge prior to leaving the factory.



