

# IPA

indoor post insulator

## FEATURES

Red epoxy resin post insulator for indoor use with OT58 brass fittings.

Used as support for indoor Medium Voltage bus bars.

Operating temperature from -25°C to +100°C.

## REFERENCE STANDARDS

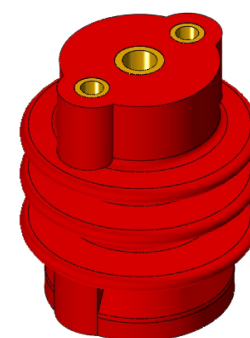
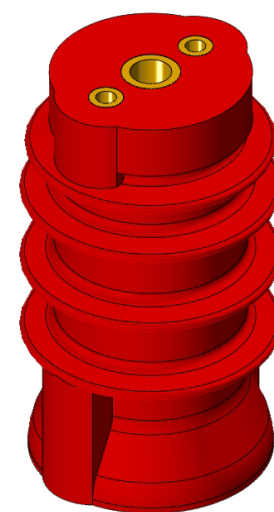
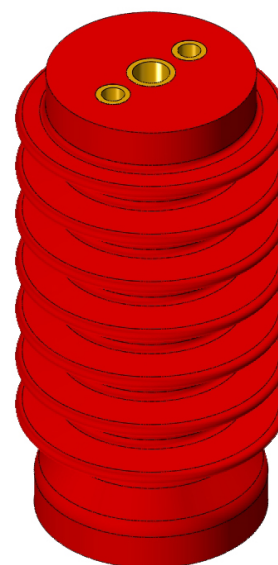
IEC 60273; IEC 60660

## ROUTINE TESTS

- Visual and dimensional check
- Bending stress
- Glass transition temperature

## TESTS ON DEMAND

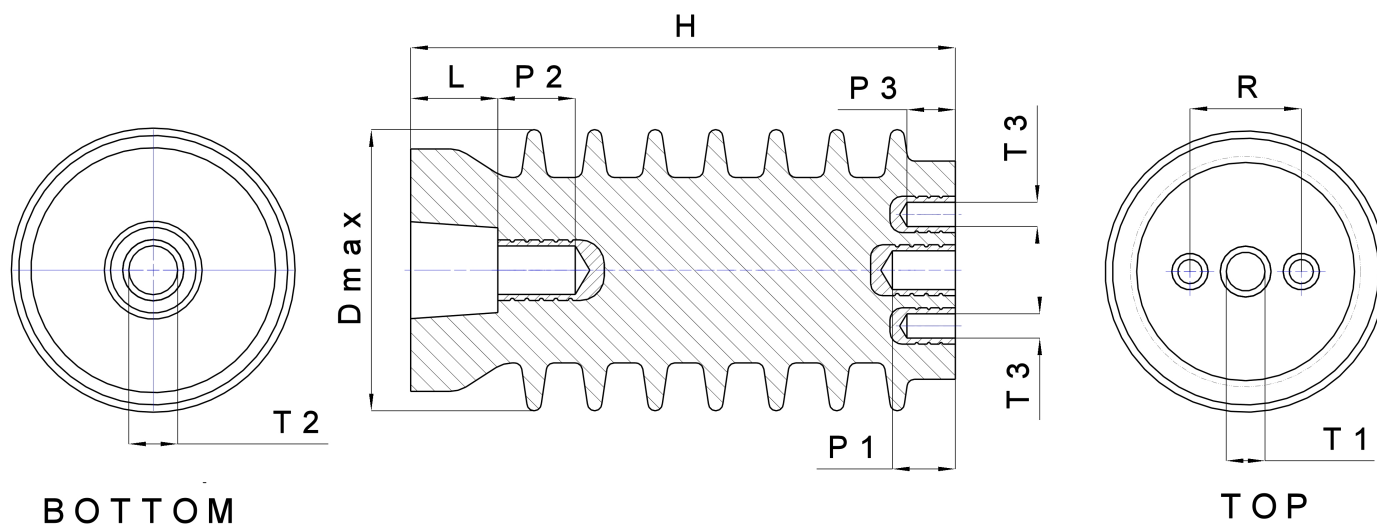
- Power frequency voltage withstand test
- Partial discharges measurement
- Dry lightning impulse voltage withstand test
- Deflection under load at normal ambient temperature conditions
- Water absorption test



IEC 60273	Name	Drawing	Max. Operating voltage	Lightning impulse voltage withstand	Power frequency voltage withstand	Ultimate bending stress
JO 4 - 40	<b>IPA 3,6/4000</b>	01004	3,6 kV	40 kV	11 kV	4 kN
JO 10 - 40	<b>IPA 3,6/10000</b>	03608				10 kN
JO 10 - 60	<b>IPA 4,8/10000</b>	04808	4,8 kV	60 kV	20 kV	10 kN
JO 4 - 60	<b>IPA 7,2/4000</b>	07204	7,2 kV	60 kV	22 kV	4 kN
JO 8 - 60	<b>IPA 7,2/8000</b>	07208				8 kN
JO 4 - 75	<b>IPA 12/4000</b>	10010	12 kV	75 kV	30 kV	4 kN
JO 8 - 75	<b>IPA 12/8000</b>	10020				8 kN
JO 16 - 75	<b>IPA 12/16000</b>	10025				16 kN
JO 8 - 95	<b>IPA 17,5/8000</b>	20020	17,5 kV	95 kV	42 kV	8 kN
JO 16 - 95	<b>IPA 17,5/16000</b>	20026				16 kN
JO 4 - 125	<b>IPA 24/4000</b> Enel DJ1053	24210	24 kV	125 kV	55 kV	4 kN
	<b>IPA 24/3000</b> Enel DJ1056	24220				
	<b>IPA 24/4000</b>	24225				
JO 8 - 125	<b>IPA 24/8000</b>	30030				8 kN
JO 10 - 125	<b>IPA 24/10000</b>	30026				10 kN
JO 4 - 170	<b>IPA 36/4000</b>	40010	36 kV	170 kV	77 kV	4 kN
JO 8 - 170	<b>IPA 36/8000</b>	40012				8 kN
JO 10 - 170	<b>IPA 36/10000</b>	40026				10 kN
JO 6 - 200	<b>IPA 40,5/6000</b>	40360	40,5 kV	200 kV	105 kV	6 kN
JO 4 - 200	<b>IPA 40,5/4000</b>	40470				4 kN

# IPA

indoor post insulator



IEC 60273	Name	Drawing	H	Dmax	T1	P1	T2	P2	L	T3	P3	R	Creepage distance	Class IEC 60815	Weight (kg)
JO 4 - 40	<b>IPA 3,6/4000</b>	01004	60	60	M12	19	M12	19	0	---	---	---	>70	classe C	0,5
JO 10 - 40	<b>IPA 3,6/10000</b>	03608	60	82	M12	18	M12	18	0	M6	15	36	>85	classe C	0,45
JO 10 - 60	<b>IPA 4,8/10000</b>	04808	80	82	M12	18	M16	26	0	M6	15	36	>120	classe C	0,55
JO 4 - 60	<b>IPA 7,2/4000</b>	07204	95	82	M12	26	M12	26	0	---	---	---	>150	classe C	0,55
JO 8 - 60	<b>IPA 7,2/8000</b>	07208	95	82	M12	18	M16	26	18	M8	16	46	>150	classe C	0,6
JO 4 - 75	<b>IPA 12/4000</b>	10010	130	83	M12	18	M16	26	14	M6	15	36	>235	classe B	0,7
JO 8 - 75	<b>IPA 12/8000</b>	10020	130	75	M12	18	M16	26	18	M6	15	36	>175	classe A	0,8
JO 16 - 75	<b>IPA 12/16000</b>	10025	130	116	M16	26	M20	32	36	M10	20	46	>230	classe B	1,5
JO 8 - 95	<b>IPA 17,5/8000</b>	20020	175	83	M12	26	M16	26	35	M6	15	36	>260	classe A	1,1
JO 16 - 95	<b>IPA 17,5/16000</b>	20026	175	116	M16	26	M20	32	36	M10	20	46	>300	classe B	2,2
JO 4 - 125	<b>IPA 24/4000 Enel DJ1053</b>	24210	210	80	M12	26	M16	26	0	M6	15	36	>360	classe A	1,1
	<b>IPA 24/3000 Enel DJ1056</b>	24220	225	80	M12	26	M16	26	0	M6	15	36	>370	classe A	1,2
	<b>IPA 24/4000</b>	24225	225	80	M12	18	M16	26	35	M6	15	36	>370	classe A	1,2
JO 8 - 125	<b>IPA 24/8000</b>	30030	225	93	M12	18	M16	26	18	M6	15	36	> 350	classe A	1,6
JO 10 - 125	<b>IPA 24/10000</b>	30026	225	116	M16	26	M20	32	36	M10	20	46	> 400	classe B	2,6
JO 4 - 170	<b>IPA 36/4000</b>	40010	310	80	M12	18	M16	26	32	M6	15	36	> 520	classe A	1,8
JO 8 - 170	<b>IPA 36/8000</b>	40012	310	98	M12	18	M16	40	60	M6	15	36	> 520	classe A	2,9
JO 10 - 170	<b>IPA 36/10000</b>	40026	310	116	M16	26	M20	32	36	M10	20	46	> 575	classe B	3,4
JO 6 - 200	<b>IPA 40,5/6000</b>	40360	360	98	---	---	M20	32	40	M10	25	46	> 560	classe A	3,8
JO 4 - 200	<b>IPA 40,5/4000</b>	40470	470	98	---	---	M20	32	40	M10	25	30	> 770	classe B	4,2

CT101 rev.0 del 18/07/2017

# IPAE

outdoor post insulator

## FEATURES

Grey cycloaliphatic resin post insulator for outdoor use with OT58 brass fittings.

This insulator has an improved creepage distance and special drip edge that make it perfectly suitable for high-polluted outdoor application. (D level – IEC 60815).

Used as support for outdoor Medium Voltage bus bars.

Operating temperature from -25°C to +90°C.

## STANDARDS

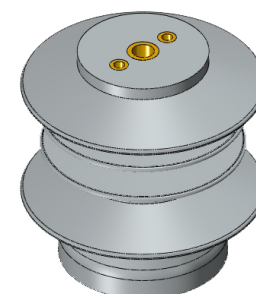
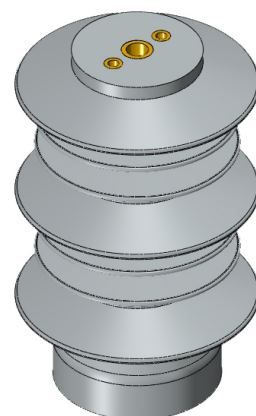
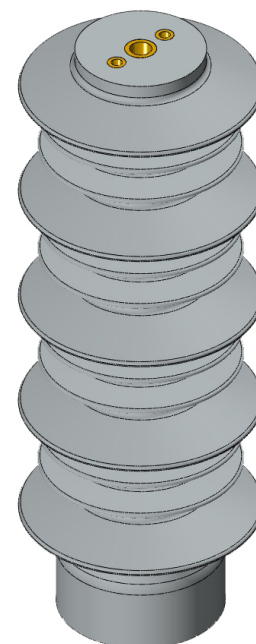
IEC 60273; IEC 60660; IEC 60815 **ROUTINE**

## TESTS

- Visual and dimension check
- Bending stress
- Glass transition temperature

## TESTS ON DEMAND

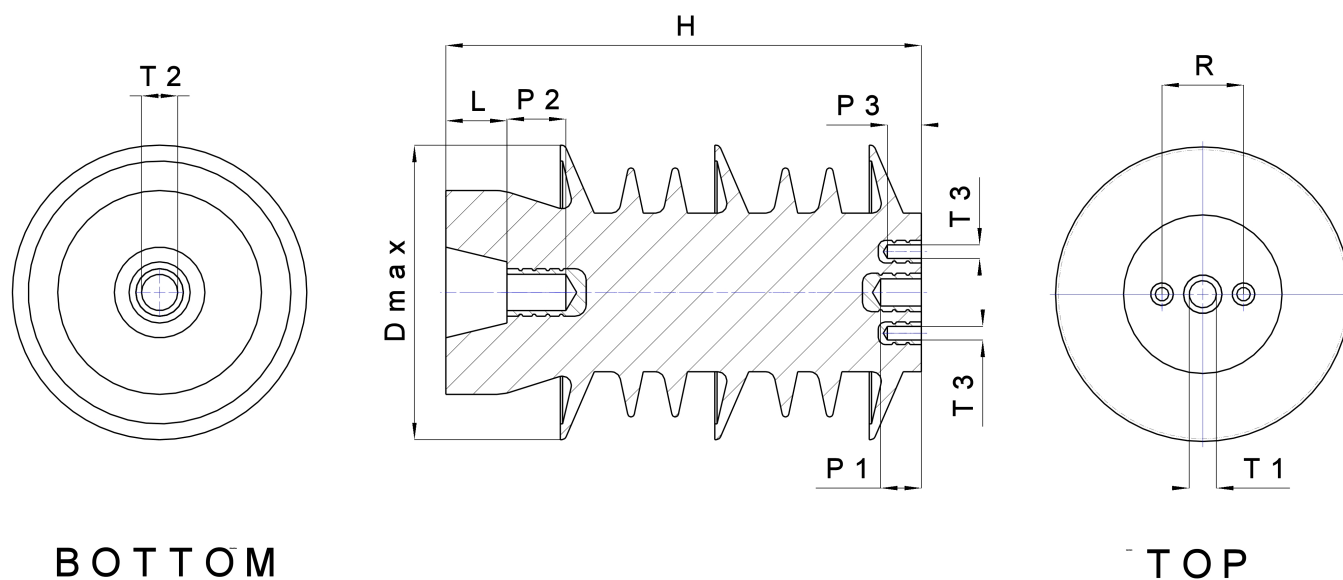
- Power frequency voltage withstand test
- Partial discharges measurement
- Dry lightning impulse voltage withstand test
- Deflection under load at normal ambient temperature conditions
- Water absorption test



IEC 60273	Name	Drawing	Max. Operating voltage	Lightning impulse voltage withstand	Power frequency voltage withstand	Ultimate bending stress
JO 10 -75	<b>IPAE 10</b>	70100	12 kV	75 kV	30 kV	10 kN
JO 10 - 95	<b>IPAE 15</b>	70175	17.5 kV	95 kV	42 kV	10 kN
JO 8 - 95	<b>IPAE 15</b>	70200				8 kN
JO 6 - 125	<b>IPAE 20</b>	70300	24 kV	125 kV	55 kV	6 kN
JO 4 - 170	<b>IPAE 30</b>	70400	36 kV	170 kV	77 kV	4 kN
JO 2 - 200	<b>IPAE 40</b>	70505	40.5 kV	200 kV	105 kV	2.5 kN

# IPAE

outdoor post insulator



BOTTOM

TOP

IEC 60273	Name	Drawing	H	Dmax	T1	P1	T2	P2	L	T3	P3	R	Creepage distance	Class IEC 60815	Weight (kg)
JO 10 - 75	IPAE 10	70100	130	130	M12	18	M16	26	27	M6	15	36	>320	D Level	1,4
JO 10 - 95	IPAE 15	70175	175	130	M16	26	M20	32	27	---	---	---	>440	D Level	1.9
JO 8 - 95	IPAE 15	70200	210	130	M12	18	M16	26	27	M6	15	36	>520	D Level	2,3
JO 6 - 125	IPAE 20	70300	295	130	M12	18	M16	26	27	M6	15	36	>730	D Level	3,2
JO 4 - 170	IPAE 30	70400	360	130	M12	18	M16	26	27	M6	15	36	>910	D Level	3,9
JO 2 - 200	IPAE 40	70505	505	130	M12	26	M24	40	45	M6	15	36	>1160	D Level	5.6

CT102 rev.0 del 18/07/2017

# ISA

low voltage post insulator

## FEATURES

Black epoxy resin post insulator for indoor use with metal fittings for low voltage applications (up to 2 kV).

This insulator is casted using an auto-extinguishing epoxy resin to comply with the highest safety standards (UL 94, level V0).

It is used as bus bar support for indoor low voltage application with high safety standards.

Operating temperature from -25°C to +160°C.

## STANDARDS

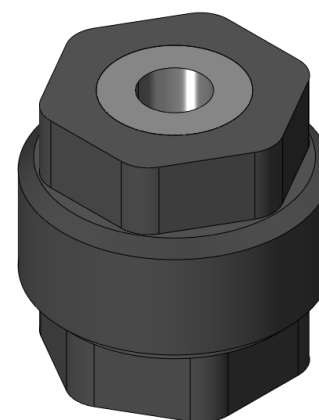
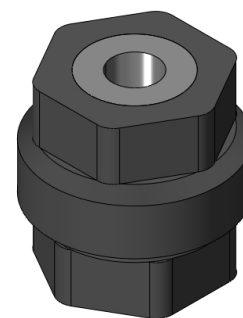
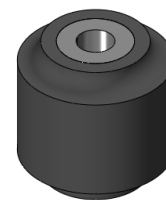
UL 94

## ROUTINE TESTS

- Visual and dimensional check

## TESTS ON DEMAND

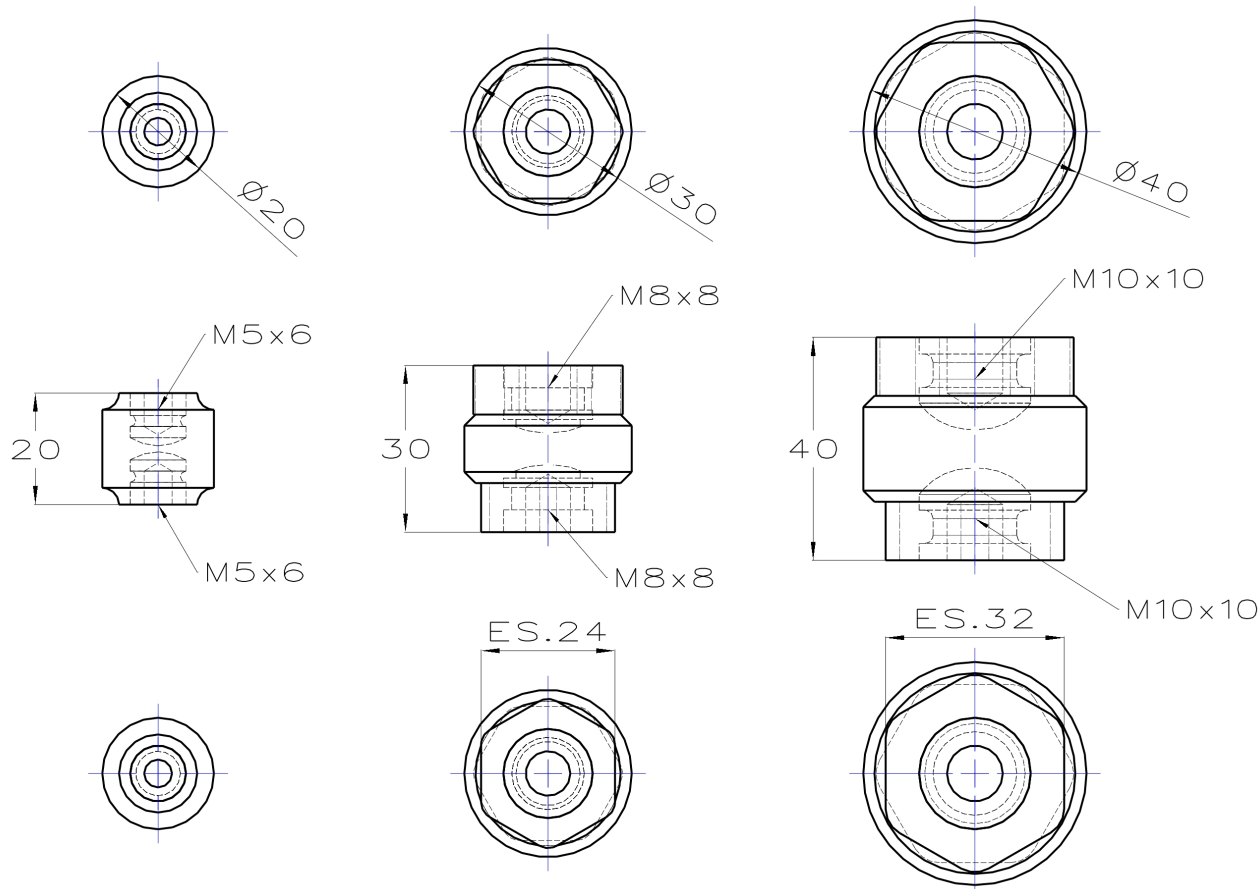
- Bending stress test
- Tensile stress test



Name	Drawing	Max. operating voltage	Ultimate bending stress	Ultimate tensile stress	Weight
ISA 20/20 M5	U2215	0.4 kV	1.5 kN	2.5 kN	0.01 kg
ISA 30/30 M8	U3308	2 kV	4 kN	8 kN	0.06 kg
ISA 40/40 M10	U4410	2 kV	5 kN	10 kN	0.13 kg

# ISA

low voltage post insulator



**U 2 2 1 5**

**U 3 3 0 8**

**U 4 4 1 0**

Name	Drawing	Max. operating voltage	Ultimate bending stress	Ultimate tensile stress	Weight
ISA 20/20 M5	U2215	0.4 kV	1.5 kN	2.5 kN	0.01 kg
ISA 30/30 M8	U3308	2 kV	4 kN	8 kN	0.06 kg
ISA 40/40 M10	U4410	2 kV	5 kN	10 kN	0.13 kg

CT103 rev.0 del 18/07/2017

# DC - DCP

capacitive insulator with bottom connection

## FEATURES

Post insulator with capacitive coupling for air insulated indoor applications.

Thanks to this capacitive coupling, it is possible, through the bottom connection, to get a signal proportional to the network voltage. This signal can be read by a voltage presence indicator box, this device will display with a light if the line is operating.

This insulator is made of red epoxy cast resin with OT58 brass fittings.

It can be supplied with a special connection (AT 4482) on which it is possible to install a safety valve (ATS 4500) that protects the downstream circuit from overvoltage above 600V.

## REFERENCE STANDARDS

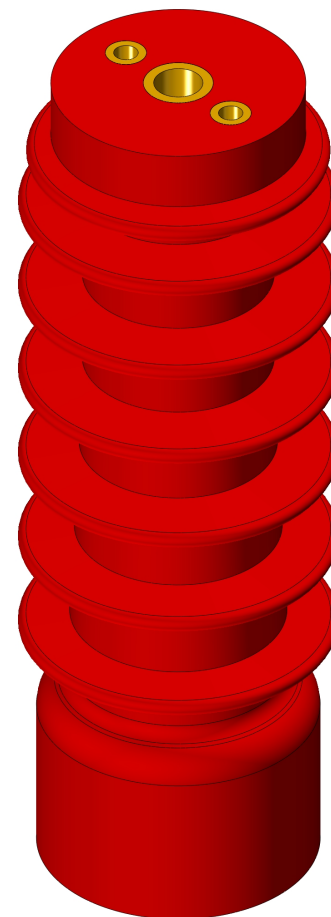
IEC 60660, IEC 60137 (electrical tests)

## ROUTINE TESTS

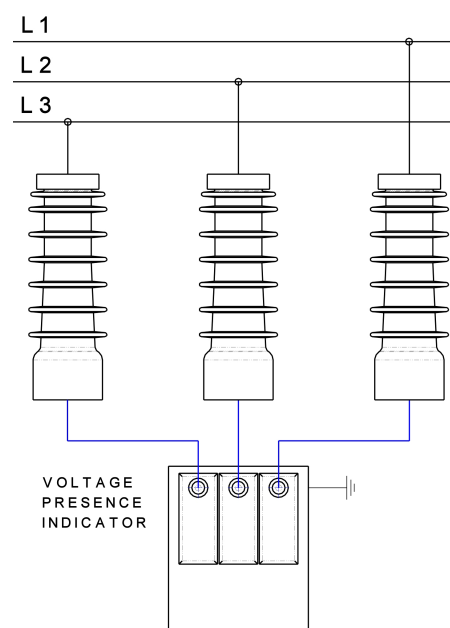
- Visual and dimensional check
- Bending stress
- Glass transition temperature
- Partial discharges measurement
- Dry power frequency voltage withstand test

## TESTS ON DEMAND

- Dry lightning impulse voltage withstand test
- Deflection under load at normal ambient temperature conditions
- Water absorption test
- Electrical characterization

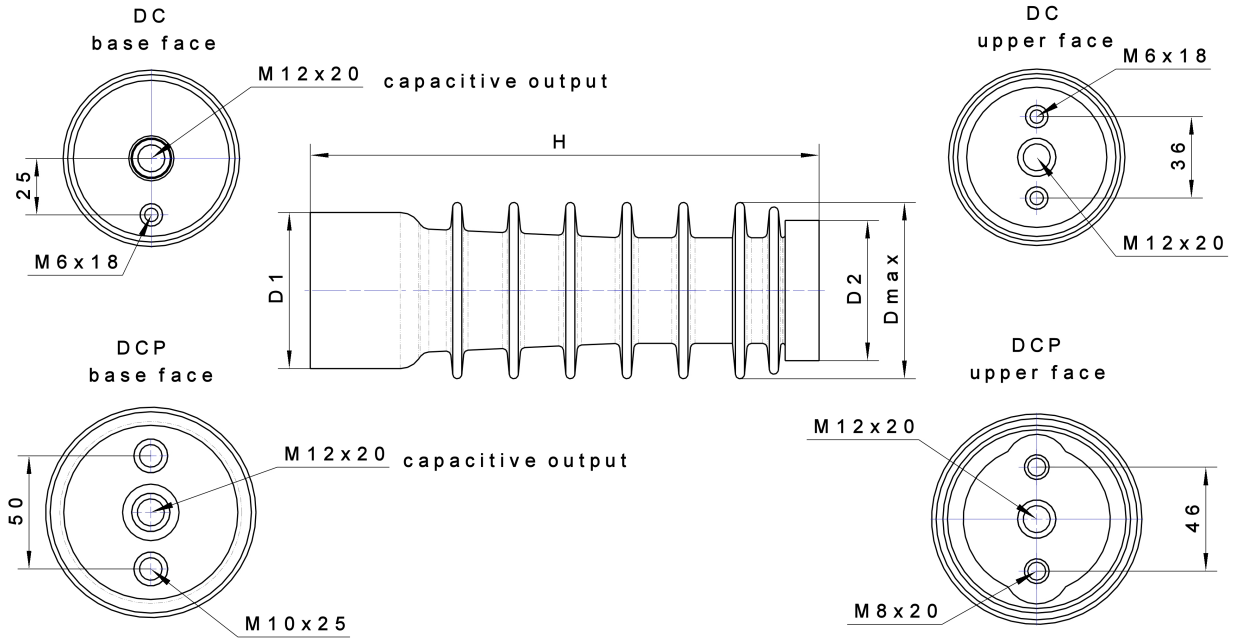


Name	Drawing	Max. Operating voltage	Lightning impulse voltage withstand	Power frequency voltage withstand	Capacitance (±20%)	Ultimate bending stress
DC 12	50010	12 kV	75 kV	30 kV	150 pF	3 kN
DC 17	50012	17.5 kV	95 kV	42 kV		
DC 24	50013	24 kV	125 kV	55 kV		
DC 36	50021	36 kV	170 kV	77 kV	75 pF	5 kN
DCP 12	50015	12 kV	75 kV	30 kV	150 pF	
DCP 17	50017	17.5 kV	95 kV	42 kV		
DCP 24	50018	24 kV	125 kV	55 kV		
DCP 36	50019	36 kV	170 kV	77 kV	75 pF	

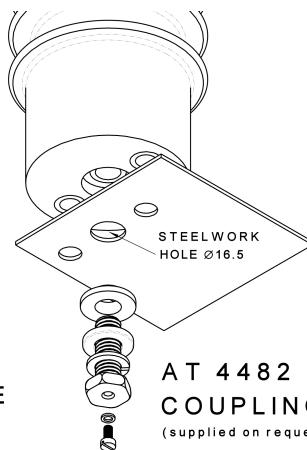


# DC - DCP

capacitive insulator with bottom connection

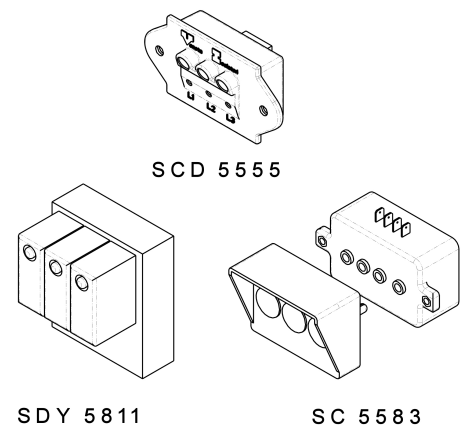


Name	Drawing	H	D1	D2	Dmax	Creepage Distance	Weight (kg)
DC 12	50010	130	Ø 75	Ø 65	Ø 75	>175	0.8
DC 17	50012	175	Ø 76	Ø 62	Ø 83	>260	1.1
DC 24	50013	225	Ø 70	Ø 62	Ø 78	>355	1.3
DC 36	50021	310	Ø 80	Ø 55	Ø 80	>520	1.8
DCP 12	50015	130	Ø 75	Ø 65	Ø 75	>175	0.8
DCP 17	50017	175	Ø 76	Ø 62	Ø 83	>260	1.1
DCP 24	50018	225	Ø 77	Ø 70	Ø 93	>350	1.6
DCP 36	50019	310	Ø 94	Ø 76	Ø 98	>520	2.9



## VOLTAGE PRESENCE INDICATORS

suitable for DC-DCP series



CT104 rev.0 del 18/07/2017



# DCL

capacitive insulator with lateral connection

## FEATURES

Post insulator with capacitive coupling for air insulated indoor applications.

Thanks to this capacitive coupling, it is possible, through the lateral connection, to get a signal proportional to the network voltage. This signal can be read by a voltage presence indicator box, this device will display with a light if the line is operating.

This insulator is made of red epoxy cast resin with OT58 brass fittings.

It can be supplied with a safety valve (ATS 4700) that protects the downstream circuit from overvoltage above 600V.

## STANDARDS

IEC 60660, IEC 60137 (electrical tests), Enel DJ 1054 and DJ 1550 (homologation).

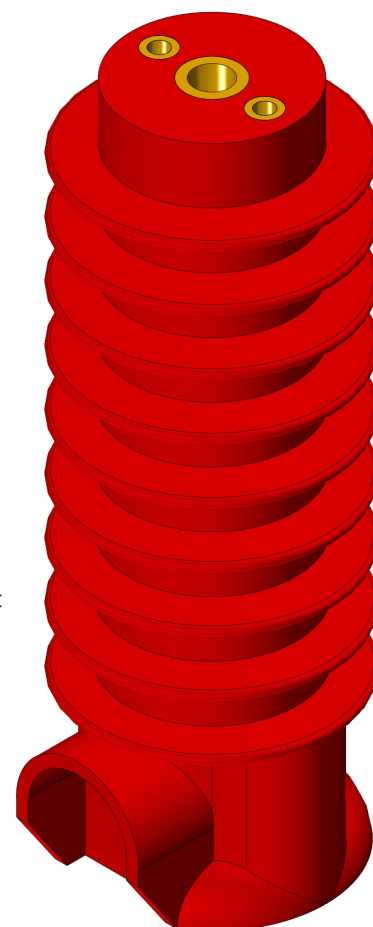
## ROUTINE TESTS

- Visual and dimensional check
- Bending stress
- Glass transition temperature
- Partial discharges measurement
- Dry power frequency voltage withstand test

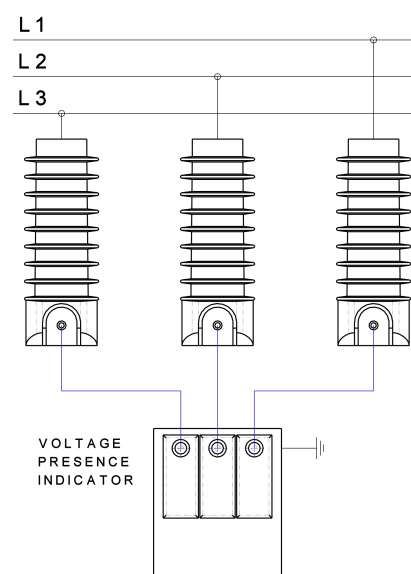
## TESTS ON DEMAND

- Dry lightning impulse voltage withstand test
- Deflection under load at normal ambient temperature conditions (\*)
- Water absorption test (\*)
- Electrical characterization(\*)

(\*) standard for DJ 1054

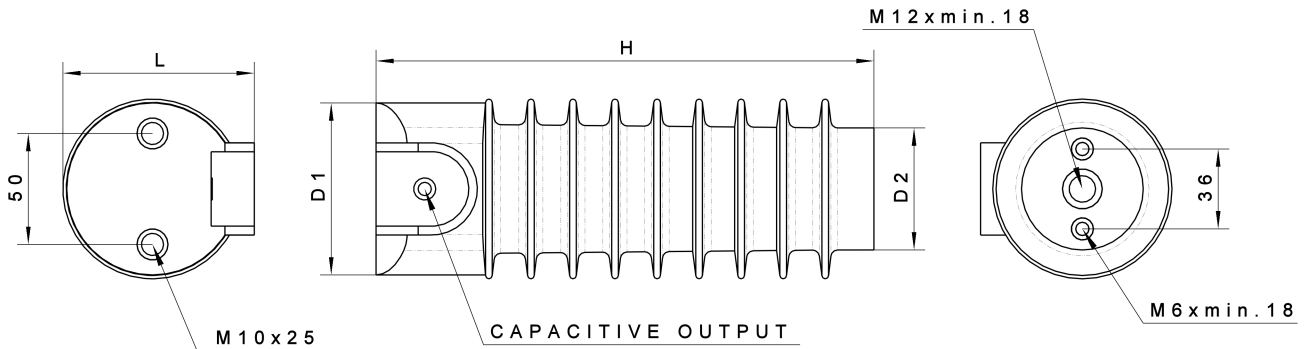


Name	Drawing	Max. Operating voltage	Lightning impulse voltage withstand	Power frequency voltage withstand	Capacitance ( $\pm 20\%$ )	Ultimate bending stress
DCL 12	50030	12 kV	75 kV	30 kV	150 pF	4 kN
	50031					
DCL 17	50070	17.5 kV	95 kV	42 kV	150 pF	4 kN
	50071					
DCL 24	50040	24 kV	125 kV	55 kV	150 pF	3 kN
	50042					
DCL 36	50310	36 kV	170 kV	77 kV	75 pF	3 kN
	50312					
ENEL DJ 1054 HOMOLOGATION						
DCL 24/1	52054	24 kV	125 kV	55 kV	100÷700 M $\Omega$ Ed.2 -2005	3 kN
	52055					
DCL 24/3	53054	24 kV	125 kV	55 kV	100÷350 M $\Omega$ Ed.3 -2013	3 kN
	53055					

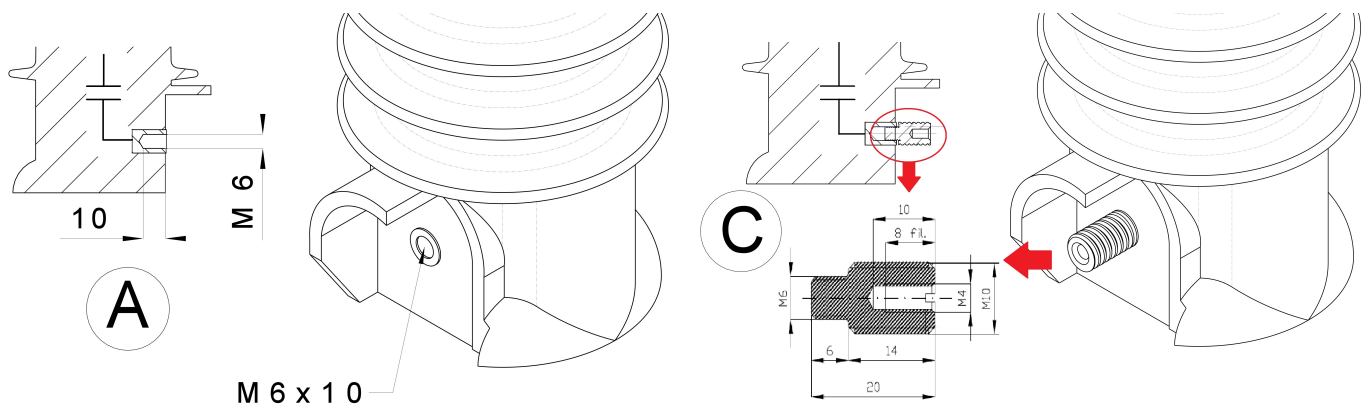


# DCL

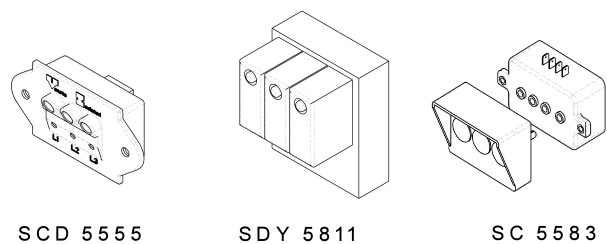
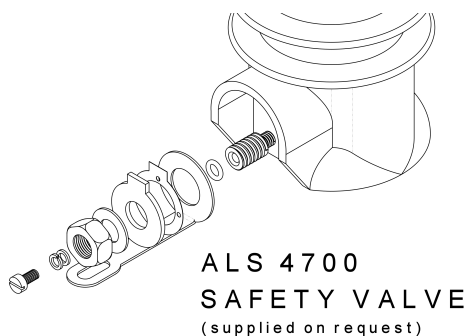
capacitive insulator with lateral connection



Name	Drawing	Capacitive output	H	D1	D2	L	Creepage distance	Weight (kg)
DCL 12	50030	A	130	Ø 74	Ø 53	87	>165	0.9
	50031	C						
DCL 17	50070	A	175	Ø 74	Ø 53	87	>245	1.1
	50071	C						
DCL 24	50040	A	225	Ø 74	Ø 55	88	>350	1.4
	50042	C						
DCL 36	50310	A	310	Ø 80	Ø 55	90	>490	2.2
	50312	C						
<b>Omologated by ENEL DJ 1054</b>								
DCL 24/I	52054	A	225	Ø 74	Ø 55	88	>350	1.8
	52055	C						
DCL 24/3	53054	A	225	Ø 74	Ø 55	88	>350	1.8
	53055	C						



**VOLTAGE PRESENCE INDICATORS**  
suitable for DCL series



CT105 rev.0 del 18/07/2017

# SC - SCD

voltage presence indicators

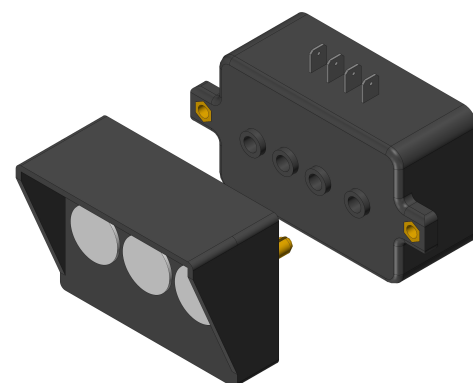
## FEATURES

This voltage presence indicators are used to get information from the grid they are connected to. Each phase has its own lamp (L1, L2, L3) and the voltage presence is indicated when the lamp is on. This data can be gathered using capacitive outputs on post insulators like DC, DCP, DCL or PTC and PTQ bushings.

### SC 5583

SC 5583 device is made of two parts: a fix base and a removable front part housing three lamps.

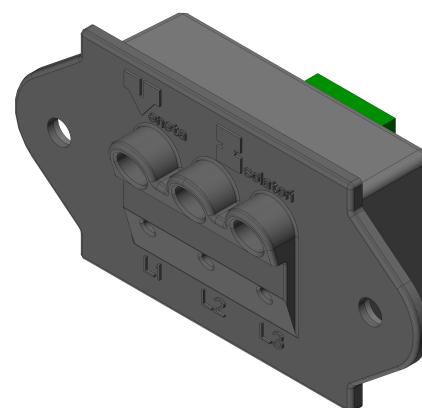
This voltage presence indicator is equipped with gas surge arresters for each phase. The safety system turns on when a 600V overcharge occurs. Surge arresters are self-resetting this means that once the overvoltage is over, the device continues to work.



### SCD 5555

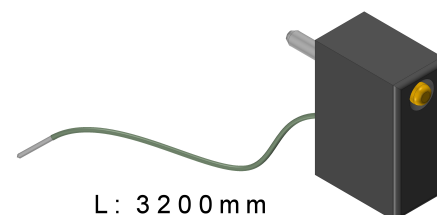
SCD 5555 is a compact voltage presence indicator with three plugs beneath the lamps. With DCF 6500 device (supplied separately) it is possible to check the phase concordance between electrical equipment.

This voltage presence indicator is equipped with gas surge arresters for each phase. The safety system turns on when a 600V overcharge occurs. Surge arresters are self-resetting this means that once the overvoltage is over, the device continues to work.



### DCF 6500

With DCF it is possible to check whether the same lamp (L1, L2, L3) of two different voltage presence indicators on two different devices are matching the same phase. If there is concordance, the lamp remains switched off while if there is no match the lamp turns on.

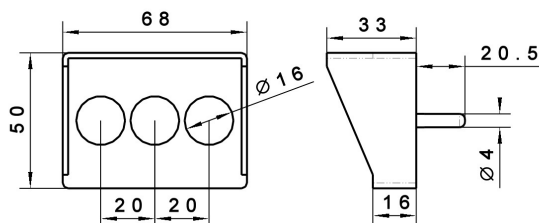
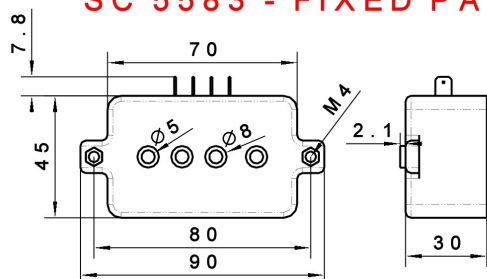


# SC - SCD

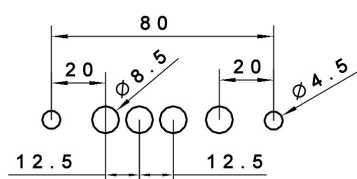
voltage presence indicators

## SC 5583 - FIXED PART

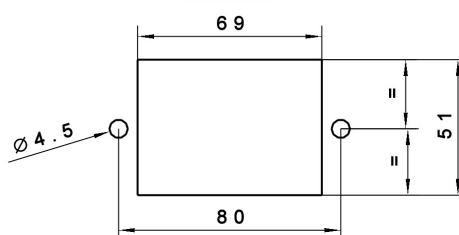
## SC 5583 - MOBILE PART



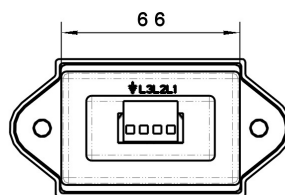
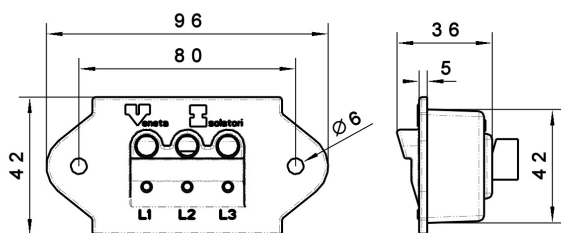
STEELWORK LAYOUT  
SOLUTION 1



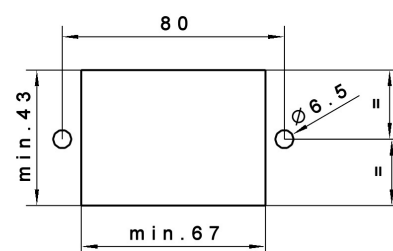
STEELWORK LAYOUT  
SOLUTION 2



## SCD 5555



STEELWORK LAYOUT  
FRONT AND BACK SIDE



Insulator	Max. operating Voltage	Rated capacitance ( $\pm 20\%$ )	Flashing light (*)	Steady light (*)
DC - DCP - DCL 10	12 kV	150 pF	1 kV	2 kV
DC - DCP - DCL 15	17.5 kV	150 pF	1 kV	2 kV
DC - DCP - DCL 20/24	24 kV	150 pF	1 kV	2 kV
DC - DCP - DCL 30	36 kV	75 pF	1 kV	6 kV
DCL 24/1	24 kV	7 pF	3kV	---
DCL 24/3	24 kV	18 pF	1 kV	14 kV
PTC 250A	24 kV	17 pF	1 kV	15 kV
PTC 400/630A	24/36 kV	26 pF	1 kV	12 kV
PTQ 250A	24 kV	14 pF	1 kV	16 kV
PTQ 400/630A	24/36 kV	21 pF	1 kV	13 kV

(\*) System phase voltage. This data are valid for a connection between insulator and voltage presence indicator with a 3m long standard cable. Data may change if other configurations are used.

# SDY - CTR

voltage presence indicators

## FEATURES

These voltage presence indicators are used along with capacitive insulators to get information from the grid they are connected to.

## STANDARDS

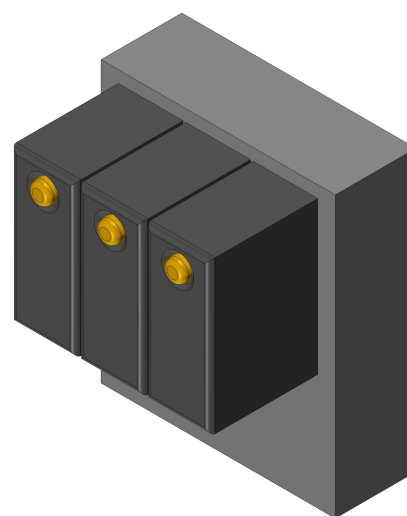
Enel DY 811, Enel DJ 1550, Enel DY 808

### SDY 5811

SDY 5811 is designed, tested and built following Enel DY 811 standard. It is built of four parts; one fix base and three removable parts, one for each phase.

The base is designed to connect the RGDAT device following Enel standard GSTP001 (ex DY 1059).

Each lamp is remains turned off when the phase-to-phase voltage is lower than 2kV, on the other hand, it flashes when the voltage goes above 6,6 kV.



### CTR

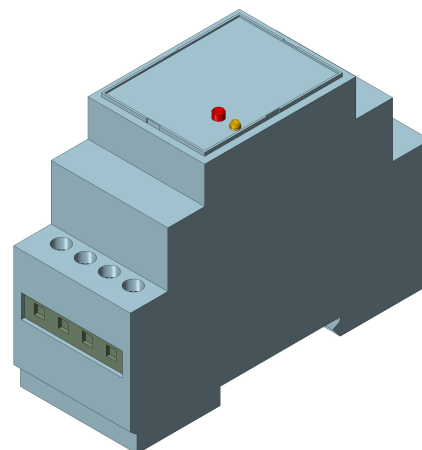
CTR is an acoustic voltage presence indicator. When the line voltage input exceed a certain level and, at the same time, the output is closed, it produces an acoustic signal.

This device receives signals from insulators with capacitive coupling, either bushings or post insulators, connected to the switchgear.

This device can work parallel with other voltage presence indicator like ENEL DY 811, without affecting the performances. (\*).

When it is connected with Enel DJ 1054 capacitive insulators, CTR complies with Enel DJ 1550: it means that the voltage presence indicator does not beep up to 2kV. The alarm activates – when output is closed – above 6.6kV. This performance is guaranteed even if only one phase is running.

This device is powered by a battery (not supplied) 3.6V, size 2/3A, minimum capacity 2.1 Ah.

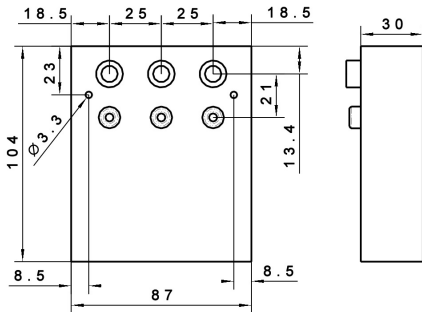


(\*) It is recommended to use screened cables to connect the insulators to the device.

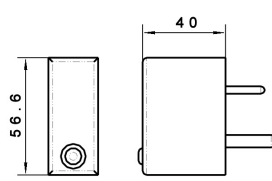
# SDY - CTR

voltage presence indicators

SDY 5811 - FIXED

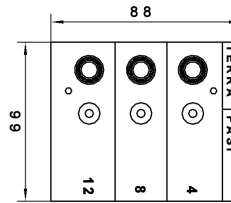


SDY 5811 - MOBILE

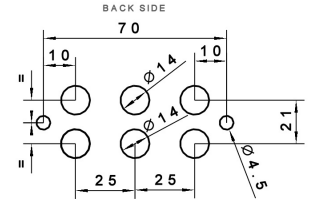


x 3

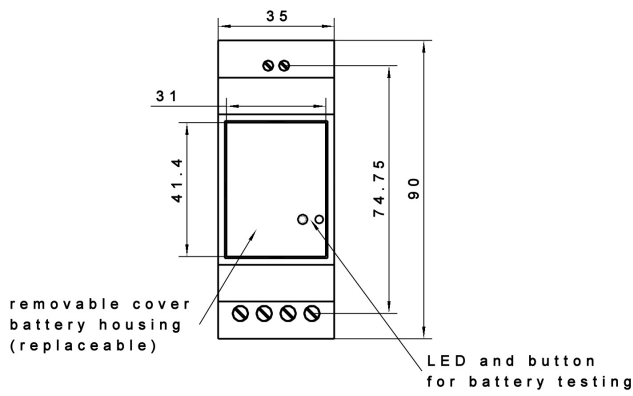
MARKING PLATE



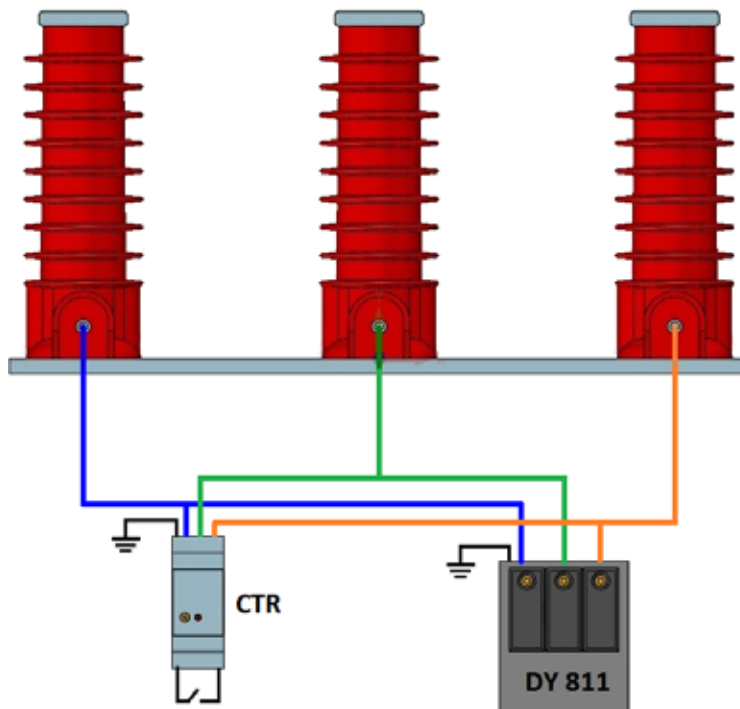
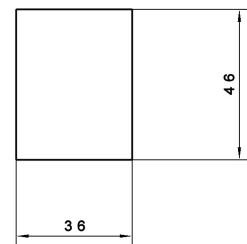
STEELWORK LAYOUT



CTR



STEELWORK LAYOUT



CT107 rev.0 del 18/07/2017

# PRG

bushing air-SF<sub>6</sub>

## FEATURES

Bushing for outdoor applications for SF<sub>6</sub> insulated devices.

It is built with an epoxy resin core that gives mechanical stability and guarantees a good insulation level. Outside is coated with silicone rubber with high weathering resistance.

This insulator is supplied with an EPDM o-ring gasket and a nuts and washers set made of nickel-plated brass for the outdoor cable connection.

It is fixed to the tank through six OT58 brass fittings and, upon request, with an aluminium flange that improves the stability.

This insulator can be also supplied with a side capacitive output.

Operating temperature from -25°C to +100°C.

## STANDARDS

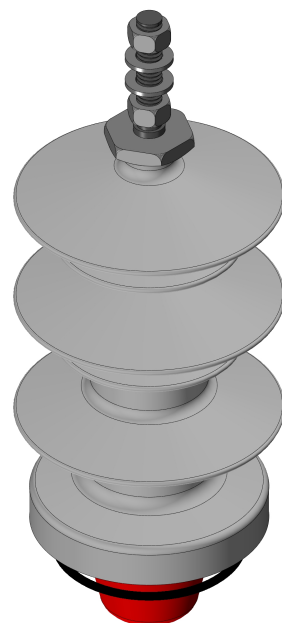
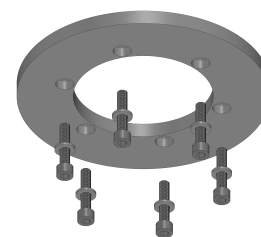
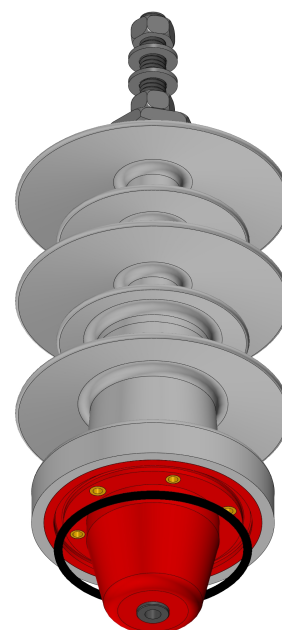
IEC 60137, IEC 60815, IEC 60507, IEC 61109 (annex C), Enel DY 1806

## ROUTINE TESTS

- Visual and dimensional check
- Glass transition temperature
- Dry power frequency withstand
- Partial discharges
- Leakage test (helium)

## TESTS ON DEMAND

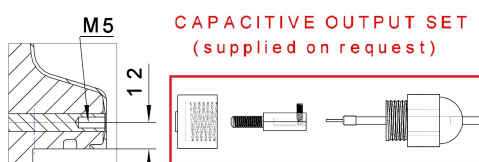
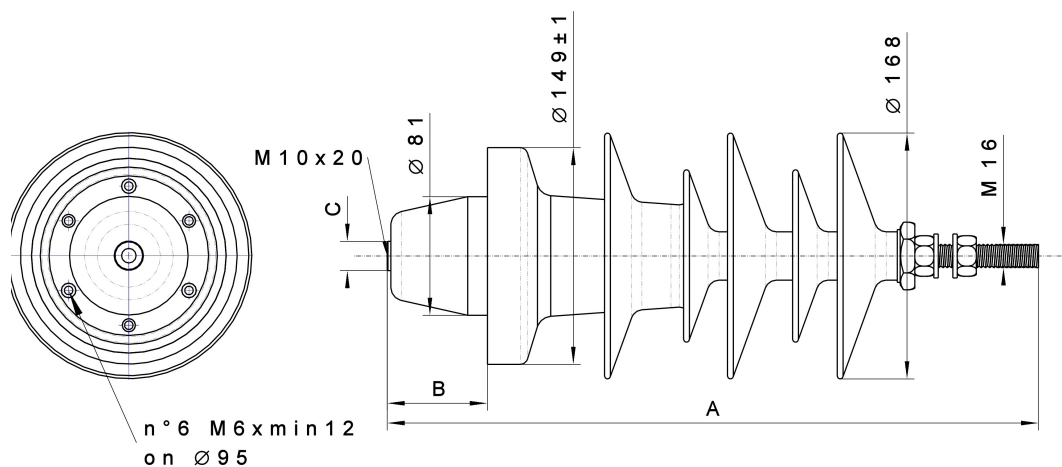
- Dry lightning impulse voltage
- Temperature
- Artificial pollution test: 1000h salt fog method (IEC 60507)
- Ageing test under operating voltage, simulating weather conditions
- 5000h wheel test (IEC 61109)



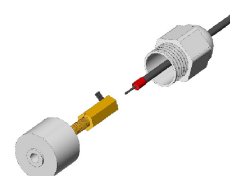
Name	Drawing	Max. Operating voltage	Lightning impulse voltage withstand	Power frequency voltage withstand	Rated current	Side capacitive output
PRG 24/400	1998	24 kV	125 kV	55 kV	400 A	NO
	2416					YES
PRG 24/630	2400	36 kV short type	170 kV	77 kV	630 A	NO
	2463					YES
PRG 36/630	3600	36 kV long type	170 kV	77 kV	630 A	NO
	3660					YES
	3636	NO				
	3633	YES				

# PRG

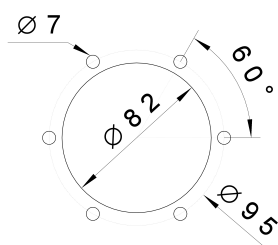
bushing air-SF<sub>6</sub>



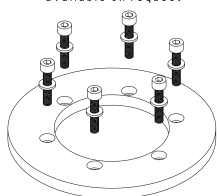
**CAPACITIVE OUTPUT SET**  
(supplied on request)



Name	Drawing	A	B	C	Creepage distance	IEC 60815 level	Weight (kg)	Side capacitive output
PRG 24/400	1998	445	68.5	Ø16	>780	Class E	3.3	NO
	2416	445	68.5	Ø16	>780	Class E	4.5	YES
PRG 24/630	2400	445	68.5	Ø20	>780	Class E	4.5	NO
	2463	445	68.5	Ø20	>780	Class E	4.5	YES
PRG 36/630	3600	507	68.5	Ø20	>1050	Class D	4.8	NO
	3660	507	68.5	Ø20	>1050	Class D	4.8	YES
	3636	547	108.5	Ø20	>1050	Class D	5.1	NO
	3633	547	108.5	Ø20	>1050	Class D	5.1	YES



FIXING SET  
available on request



## ASSEMBLING INSTRUCTIONS

- 1) Set the tank as shown on the plan.
- 2) Remove any insulating material on the holes to guarantee a correct earthing connection of the insulator.
- 3) Even out the surface where the gasket will be positioned to improve the sealing.
- 4) Position the bushing and gasket on the tank
- 5) Fasten the insulator using six screws and washers using a 9-11Nm tightening torque.
- 6) Lower connection has to be screwed (M10) at 30-35 Nm tightening torque.

CT108 rev.0 del 18/07/2017



# IPS

outdoor post insulator

## FEATURES

Gray composite outdoor post insulator.

It has a fiberglass core with good mechanical characteristics while the external surface is made of weatherproof silicone rubber.

It can be used in highly polluted environments (D Level – IEC 60815) thanks to its increased creepage distance.

Used as support for outdoor Medium Voltage applications.

## STANDARDS

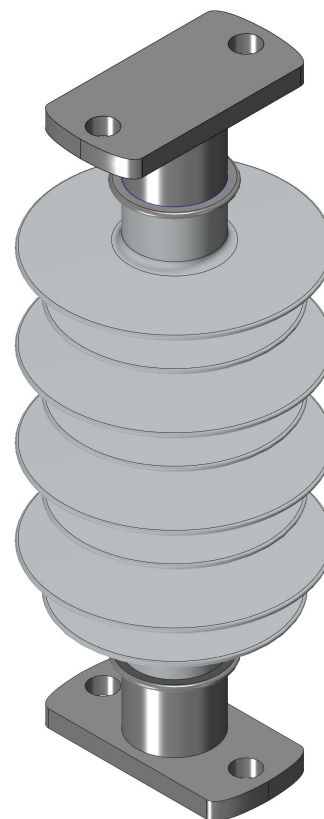
IEC 62231, IEC 61952, IEC 60507, Enel GSTP001 (former DS 3170)

## ROUTINE TESTS

- Visual and dimensional check
- Bending stress (SCL)

## TEST ON DEMAND

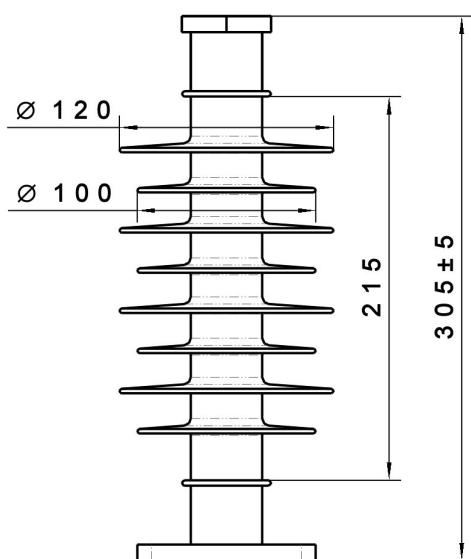
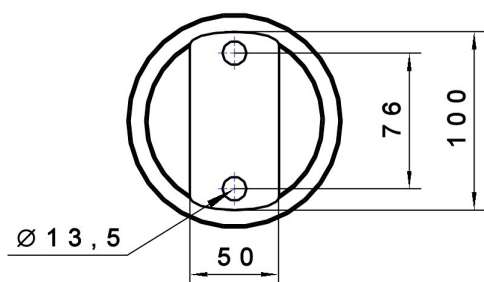
- Power frequency voltage withstand test (dry and wet)
- Dry lightning impulse voltage withstand test
- STL
- Voltage withstand test with salt fog (224 kg/m<sup>3</sup>)



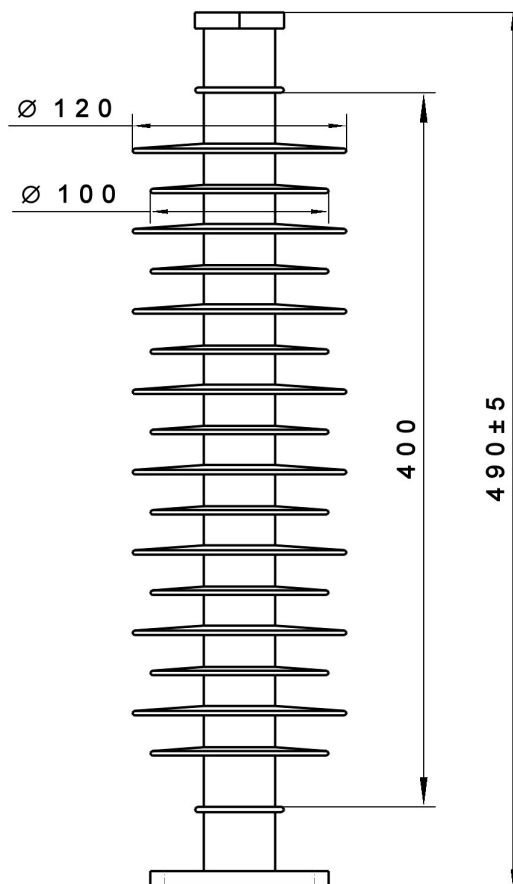
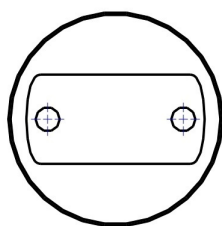
Name	Drawing	Max. Operating voltage	Lightning impulse voltage withstand	Power frequency voltage withstand	STL	SCL	Creepage distance
IPS 24	24150	24 kV	150 kV	70 kV (wet)	25 kN	5 kN	700
IPS 36	36170	36kV	170 kV	70 kV (wet)	10 kN	2 kN	1400

# IPS

outdoor post insulator



IPS 24 : 24150



IPS 36 : 36170

Name	Drawing	Max. Operating voltage	Lighting impulse voltage withstand	Power frequency voltage withstand	STL	SCL	Creepage distance
IPS 24	24150	24 kV	150 kV	70 kV (wet)	25 kN	5 kN	700
IPS 36	36170	36kV	170 kV	70 kV (wet)	10 kN	2 kN	1400

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# BSL

composite insulator for line switches

## FEATURES

Grey composite insulator for line switches.

This insulator has a resistant fiberglass core covered with weatherproof silicone rubber.

It has two aluminum termination that help the connection with the equipment.

## REFERENCE STANDARDS

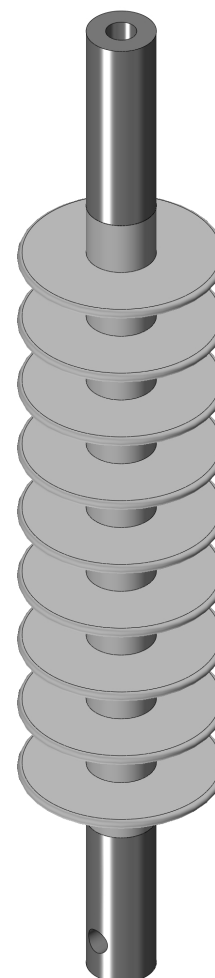
IEC 60815

## ROUTINE TESTS

- Visual and dimensional check

## TESTS ON DEMAND

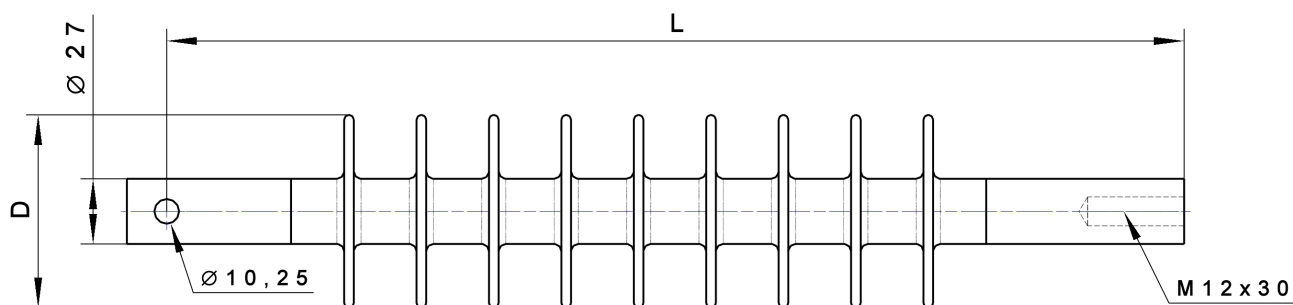
- Dry lightning impulse voltage withstand test
- Tensile stress test
- Compression stress test



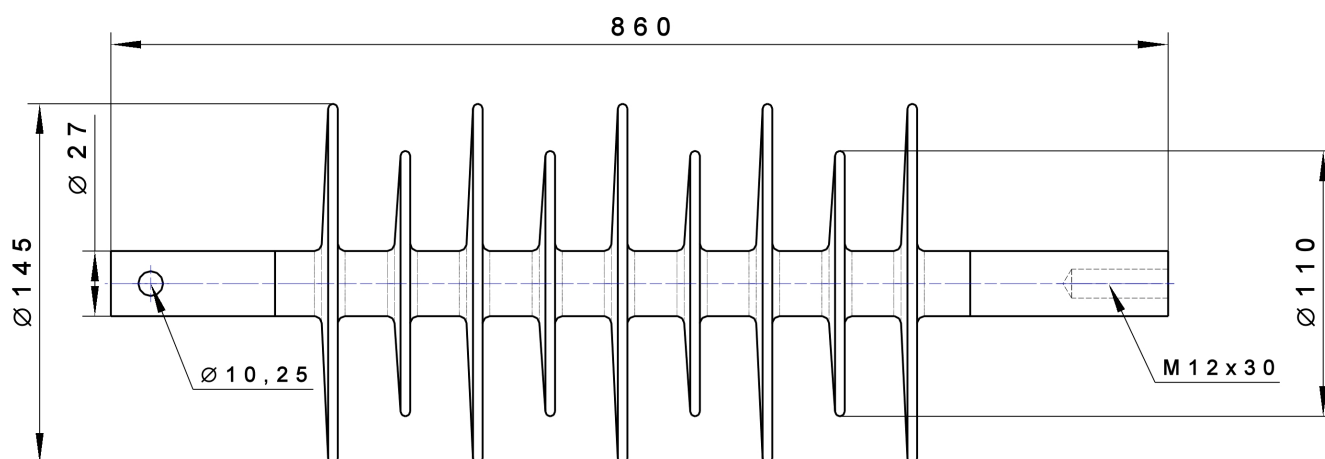
Drawing	Lightning impulse voltage withstand	Creepage distance	Ultimate tensile stress	Ultimate compression test
2501	75 kV	450	10 kN	12 kN
2502	95 kV	600		
2503	125 kV	675		
2504	170 kV	975		
2505	250 kV	1275		
2506	325 kV	1800		
2507	325 kV	1935		
2508	250 kV	1400		
2509	170 kV	1120		
34341	325 kV	2440		

# BSL

composite insulator for line switches



profile A



profile B

Drawing	Lightning impulse voltage withstand	Profile	Fins	Weight (kg)	L	D
2501	75 kV	A	6	0.5	333	Ø80
2502	95 kV		8	0.6	393	
2503	125 kV		9	0.7	423	
2504	170 kV		13	0.9	543	
2505	250 kV		17	1.2	663	
2506	325 kV		24	1.5	873	
2507	325 kV		18	2.1	873	
2508	250 kV	B	13	1.6	673	Ø115
2509	170 kV		10	1.2	543	
34341	325 kV		10+9	2.4	860	

CT110 rev.0 del 18/05/2017

# PRB

bushing air - air

## FEATURES

Red epoxy bushing for indoor air-insulated equipment with EN 50181 standard plug-in cone.

OT58 built in brass fittings allow you to fix it to the tank.

B2 (400A) version is provided with aluminium flange to fasten the bushing to the tank and secure the cable.

Operating temperature from -25°C to +100°C.

## STANDARDS

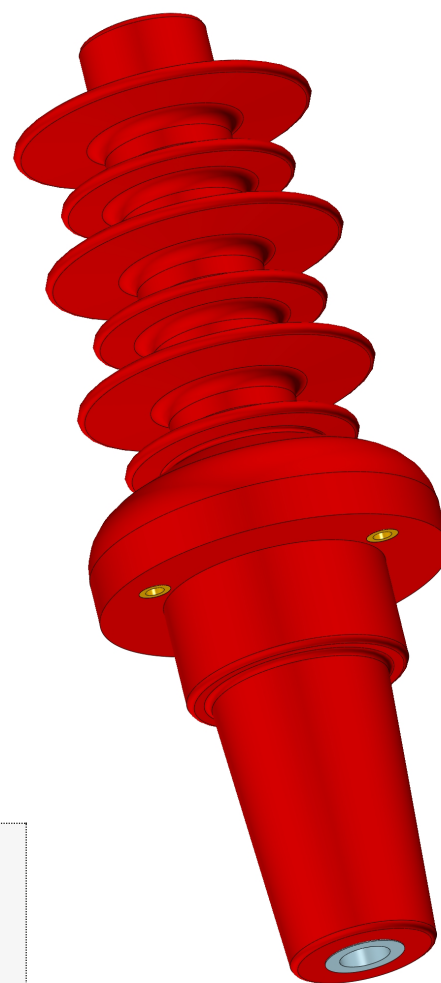
IEC 60137, EN 50181

## ROUTINE TESTS

- Visual and dimensional check
- Glass transition temperature
- Dry power frequency voltage withstand test
- Partial discharges measurement

## TESTS ON DEMAND

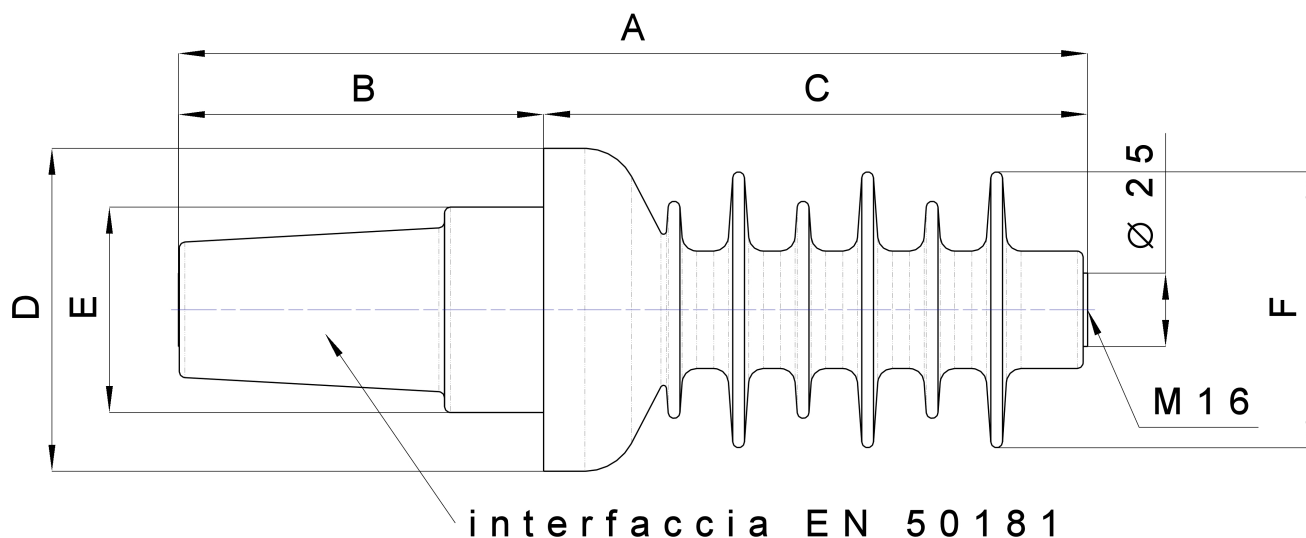
- Dry lightning impulse voltage withstand test
- Bending stress
- Temperature rise test



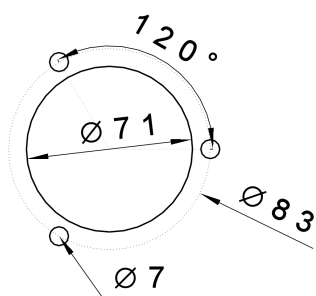
Name	Drawing	EN 50181 Connection	Max. Operating voltage	Lightning impulse voltage withstand	Power frequency voltage withstand	Rated current
PRB 24/400	2430	B2	24 kV	125 kV	55 kV	400 A
PRB 24/630	2431	C1				630 A
PRB 36/630	3670	C1	36 kV	170 kV	77 kV	630 A

# PRB

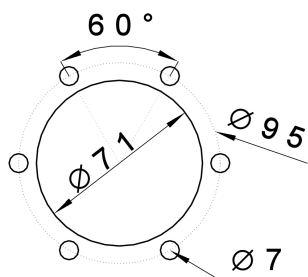
bushing air - air



Name	Drawing	A	B	C	D	E	F	Fittings dimensions	Type of connection	Weight (kg)
PRB 24/400	2430	311	124	184	Ø110	Ø70	Ø94	n°3 M6 on Ø83 at 120°	Sliding	2.7
PRB 24/630	2431	311	124	184	Ø110	Ø70	Ø94	n°3 M6 on Ø83 at 120°	Thread M16	2.7
PRB 36/630	3670	435	130	302	Ø145	Ø70	Ø145	n°6 M6 on Ø95 at 60°	Thread M16	4.2



PRB 24kV



PRB 36kV

## ASSEMBLY INSTRUCTIONS

1. Set the tank as shown on the plan.
2. Place the insulator on the tank.
3. Fasten the insulator using six screws and washers using a 9-11Nm tightening torque. 400A (PRB 2430) needs an additional aluminium flange supplied with the insulator.
4. Upper connection has to be screwed (M10) at 30-35 Nm tightening torque.

## interface EN 50181

5. Remove the plastic cap.
6. Clean the connection area.
7. Smoothly cover the connection cone with silicone grease supplied with the cable termination.
8. Connect the cable termination making sure that it abut against the insulator.
9. Be sure that all the safety features are correctly connected to the insulator.

# GMC

bushing with double EN 50181 connection

## FEATURES

Red epoxy resin bushing with double EN 50181 cable termination connection.

The A1 connection type is suitable for Medium Voltage cable junction.

Supplied with:

- ✓ earthing kit
- ✓ cleaning set
- ✓ n°2 plastic caps

## STANDARDS

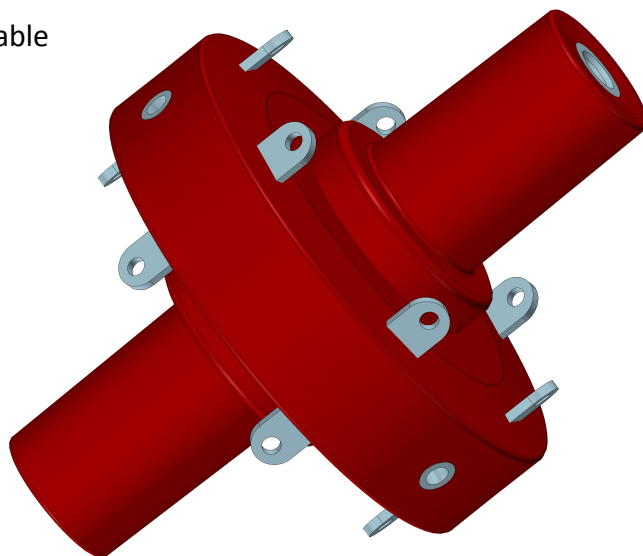
EN 50181, IEC 60137

## ROUTINE TESTS

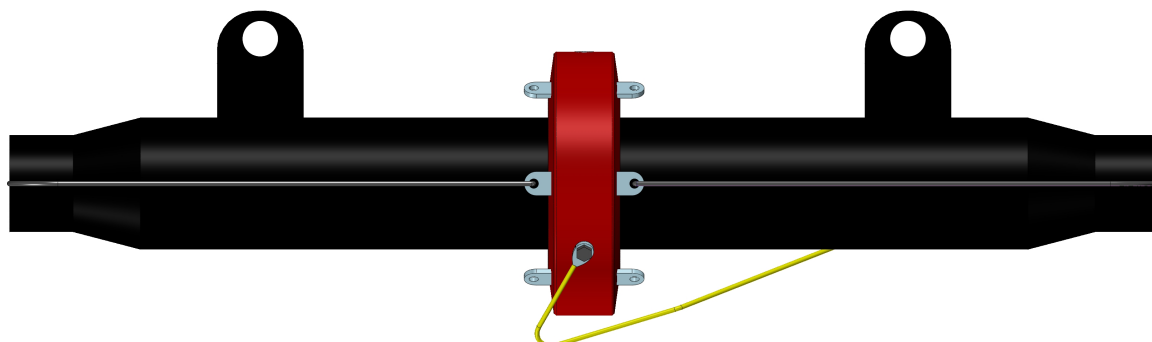
- Visual and dimensional check
- Glass transition temperature
- Dry power frequency voltage withstand test
- Partial discharges measurement

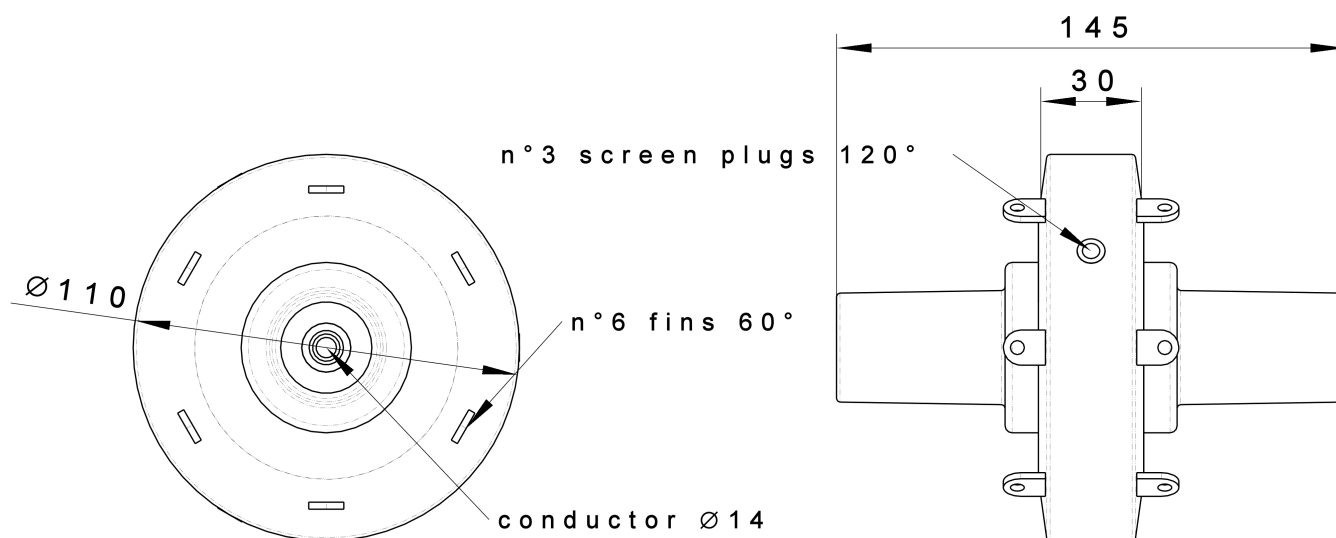
## TESTS ON DEMAND

- Dry lightning impulse voltage withstand test



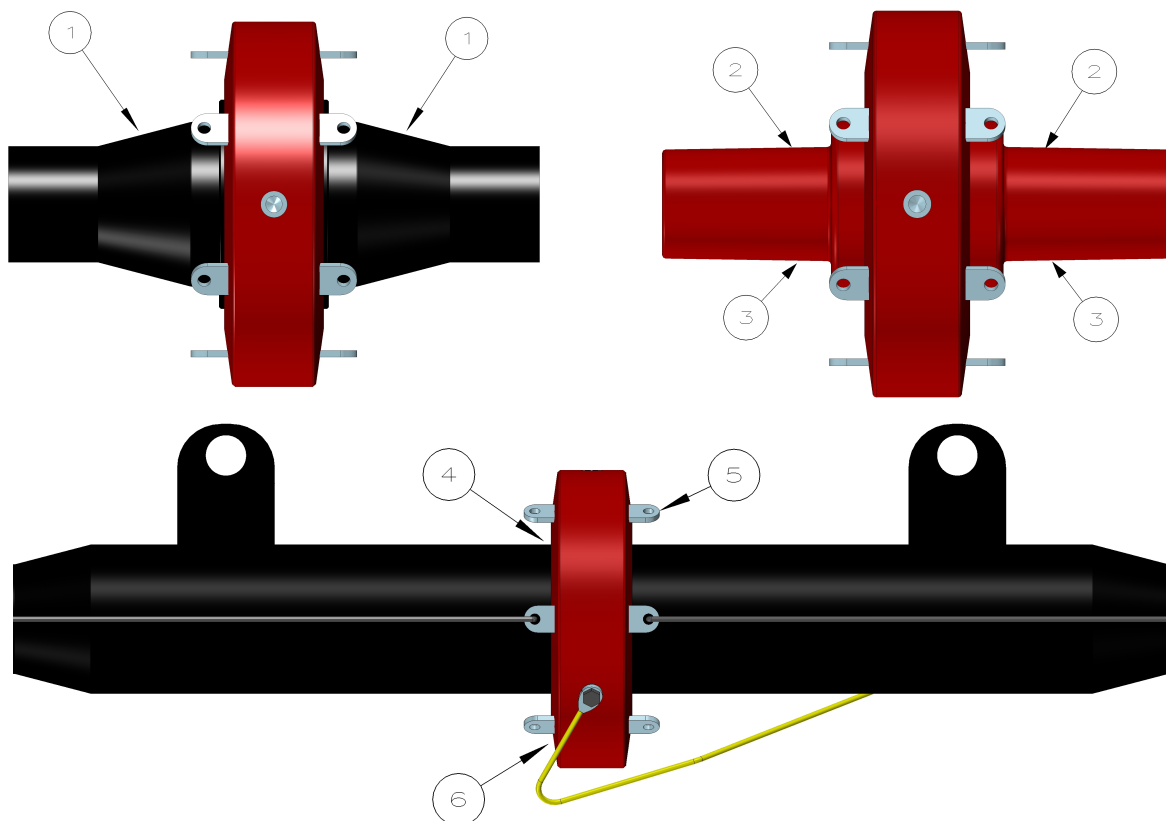
Drawing	Nominal voltage	Max. operating voltage	Power frequency voltage withstand	Rated current
1915	20 kV	24 kV	55 kV	250 A





### ASSEMBLY INSTRUCTIONS

1. Remove the plastic cap
2. Wipe carefully the connection cone using the cleaning set included with this insulator
3. Smoothly cover the connection cone with silicone grease supplied with the cable termination.
4. Plug in the cable termination, please be careful to slide it all the way in.
5. Be sure that all the safety features are correctly connected to the insulator.
6. Connect to ground one of the three screen outputs.



CT112 rev.0 del 18/07/2017



# PRI

bushing air - SF<sub>6</sub>

## FEATURES

Red epoxy bushing for indoor application for SF<sub>6</sub> insulated devices.

OT58 built in brass fittings allow you to fix it to the tank.

The screen inside the insulator allows to control the electric field and to get capacitive signal.

This insulator has a lateral capacitive output and it is supplied with EPDM O-Ring gasket.

Operating temperature from -25°C to +100°C.

## REFERENCE STANDARDS

IEC 60137

## ROUTINE TESTS

- Visual and dimensional check
- Glass transition temperature
- Dry power frequency voltage withstand test
- Leakage test (helium)
- Partial discharges measurement

## TESTS ON DEMAND

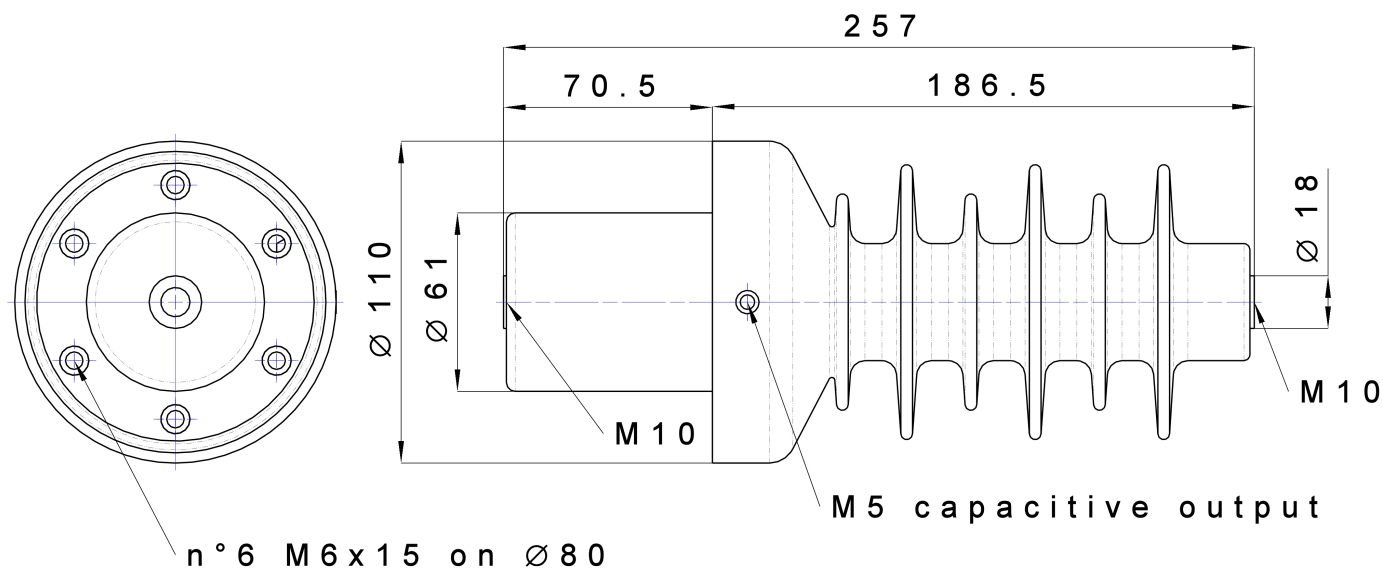
- Dry lightning impulse voltage withstand test
- Bending stress
- Temperature rise test



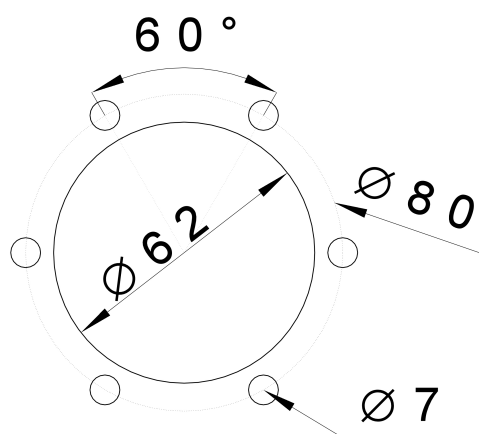
Name	Drawing	Max. operating voltage	Lightning impulse voltage withstand	Power frequency voltage withstand	Current	Creepage distance	Weight
PRI 24	85024	24 kV	125 kV	55 kV	630 A	380	1.95 kg

# PRI

bushing air - SF<sub>6</sub>



Name	Drawing	Max. operating voltage	Lightning impulse voltage withstand	Power frequency voltage withstand	Current	Creepage distance	Weight
PRI 24	85024	24 kV	125 kV	55 kV	630 A	>380	1.95 kg



## ASSEMBLY INSTRUCTIONS

1. Set the tank as shown on the plan.
2. Even out the surface where the gasket will be positioned to improve the sealing.
3. Position the bushing and gasket on the tank  
Fasten the insulator using six screws and washers using a 9-11Nm tightening torque.
4. Lower connection has to be screwed (M10) at 30-35 Nm tightening torque.
5. Make sure that the capacitive output is grounded if it is not in use.

# PTC

EN 50181 connection bushing

## FEATURES

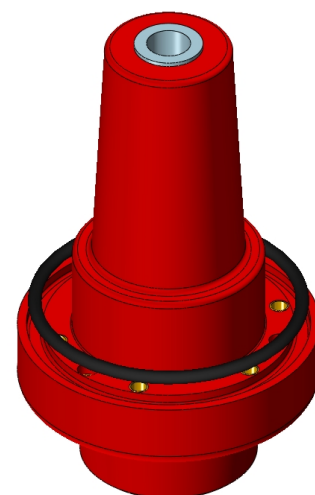
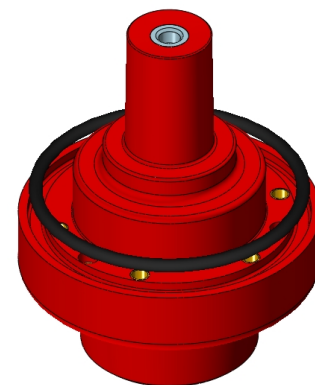
Red epoxy resin bushing for SF<sub>6</sub> gas insulated devices with EN 50181 cable termination.

It is fixed on the tank through OT58 built in brass fittings.

This insulator has a lateral capacitive outlet and it is supplied with an EPDM O-ring gasket and safety plastic cap for EN 50181 connection.

Upon request a fixing set can be supplied for this insulator that includes: aluminum flange (with eyelets for 250A and 400A versions), screws, washers and insulating spacer for the capacitive output.

Operating temperature from -25°C to +100°C.



## STANDARDS

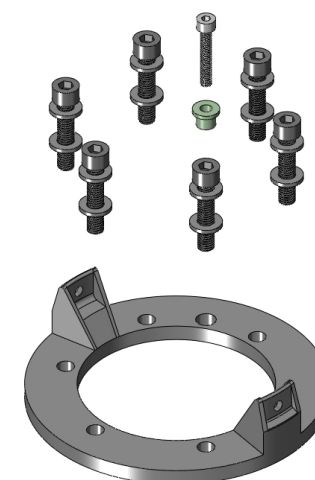
EN 50181, IEC 60137

## ROUTINE TESTS

- Visual and dimensional check
- Glass transition temperature
- Dry power frequency voltage withstand test
- Partial discharges
- Leakage test (helium)

## TESTS ON DEMAND

- Dry lightning impulse voltage withstand test



Name	Drawing	EN 50181	Max. Operating voltage	Lightning impulse voltage withstand	Power frequency voltage withstand	Rated current
PTC 24/250	1922	A1	24 kV	125 kV	55 kV	250 A
PTC 24/250-R short	1930					400 A
PTC 24/400-R short	1935	B2	36 kV	170 kV	77 kV	630 A
PTC 24/630-R short	1936	C1				400 A
PTC 36/400	1933	B2	36 kV	170 kV	77 kV	400 A
PTC 36/630	1923	C1				630 A

# PTC

## EN 50181 connection bushing

INTERFACE C1/B2  
EN 50181

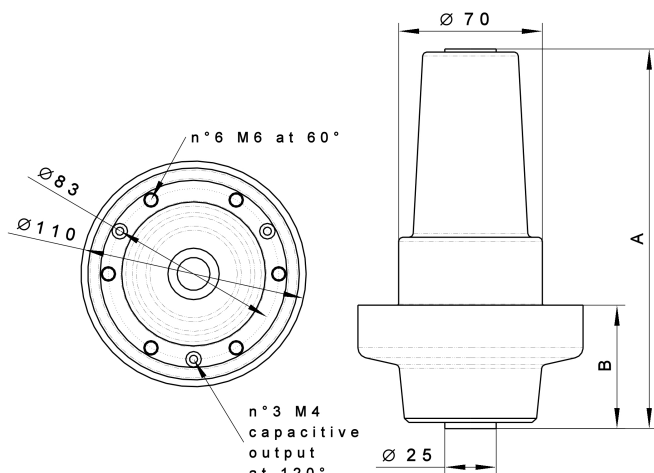


fig.1

INTERFACE A1  
EN 50181

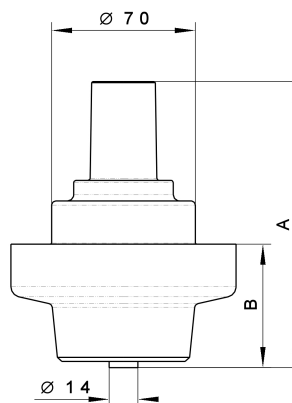
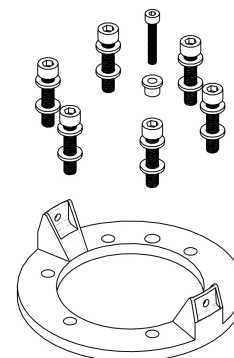
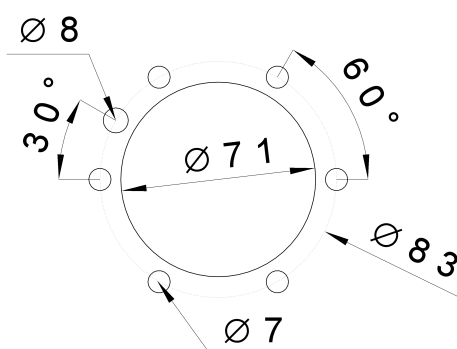


fig.2

FIXING SET  
available on request



Name	Drawing	Figure	A	B	Top connection	Lower connection	Weight (kg)
PTC 24/250	1922	fig.2	184	105	Sliding	M8	1.3
PTC 24/250-R short	1930	fig.2	140	60	Sliding	M8	1.1
PTC 24/400-R short	1935	fig.1	183	60	Sliding	M10	1.9
PTC 24/630-R short	1936	fig.1	184.5	60	Bolted M16	M10	1.9
PTC 36/400	1933	fig.1	228	105	Sliding	M10	2.3
PTC 36/630	1923	fig.1	230	105	Bolted M16	M10	2.3



### ASSEMBLY INSTRUCTIONS

1. Set the tank as shown on the plan
2. Even out the surface where the gasket will be positioned to improve the sealing.
3. Position the bushing and gasket on the tank, use the aluminium flange if necessary.
4. Fasten the PTC bushing with six M6 screws and washers using a 9-11Nm tightening torque.
5. If the capacitive output is needed, please remember to set the nylon washer first and then tighten the M4 screw to one of the three outputs. Otherwise, remember to ground at least one of the three M4 outputs.
6. Lower connection has to be screwed (M10) at 30-35 Nm and (M8) at 20-25 Nm tightening torque.

### EN 50181 connection

7. Remove the plastic cap.
8. Clean the connection area.
9. Smoothly cover the connection cone with silicone grease supplied with the cable termination.
10. Connect the cable termination making sure that it abut against the insulator.
11. Be sure that all the safety features are correctly connected to the insulator.

# PTQ

EN 50181 connection bushing

## FEATURES

Red epoxy resin bushing for SF6 gas insulated devices with EN 50181 cable termination.

It is fastened on the tank through OT58 built in brass fittings.

This insulator has a lateral capacitive outlet and it is supplied with an EPDM O-ring gasket and safety plastic cap for EN 50181 connection.

This bushing is designed to be installed on compact devices saving space.

Operating temperature from -25°C to +100°C.

## STANDARDS

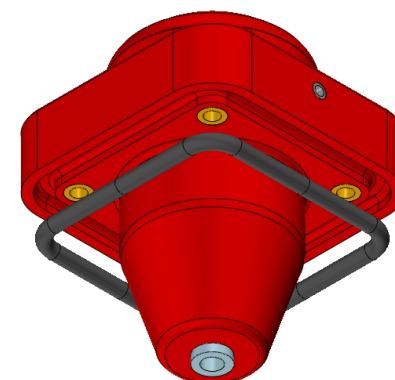
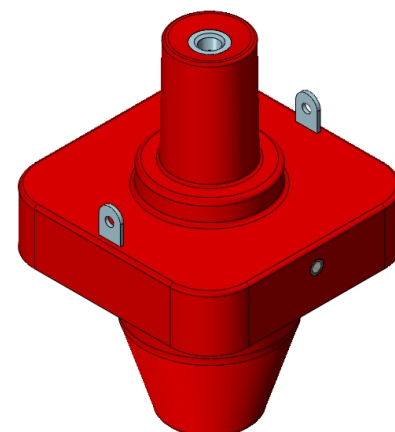
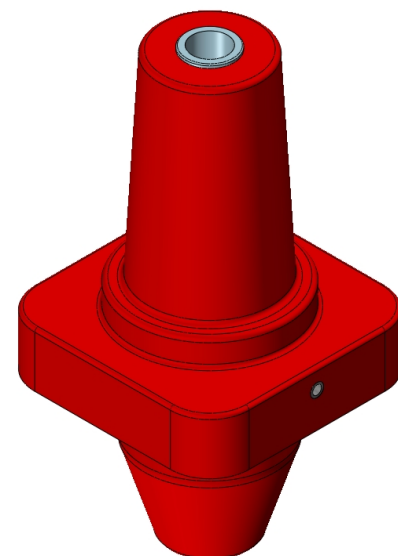
EN 50181, IEC 60137

## ROUTINE TESTS

- Visual and dimensional check
- Glass transition temperature
- Dry power frequency withstand voltage test
- Partial discharges measurement
- Leakage test (helium)

## TESTS ON DEMAND

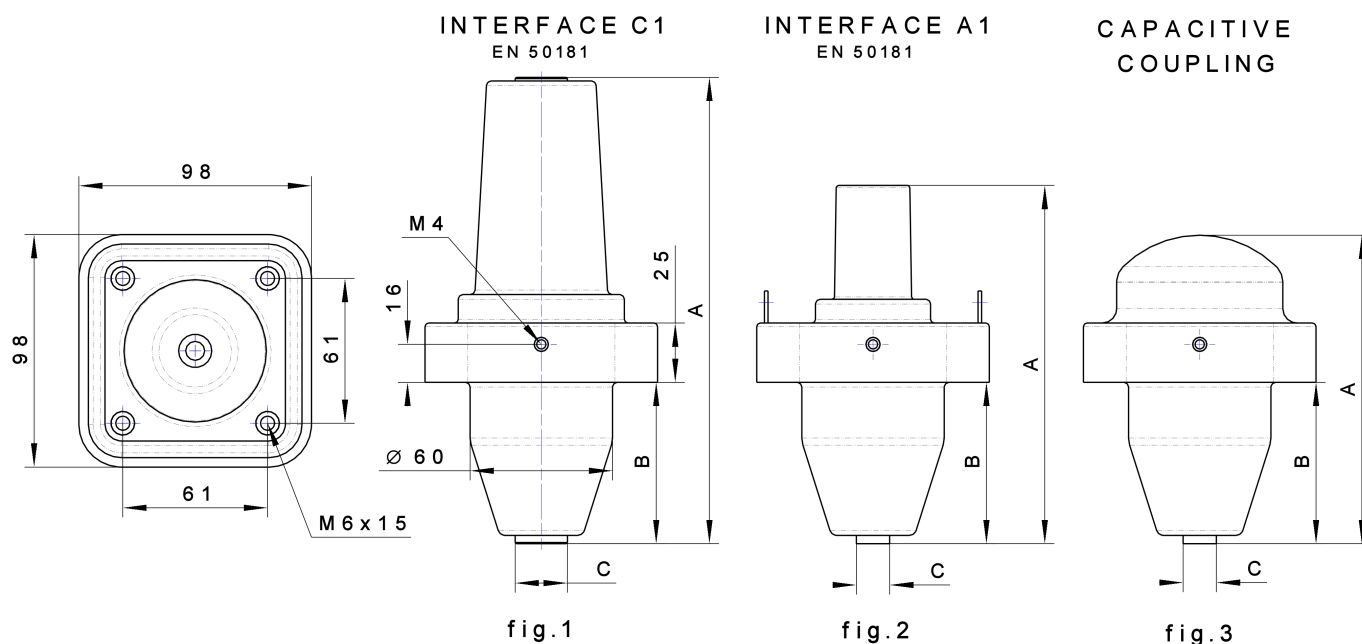
Dry lightning impulse voltage test



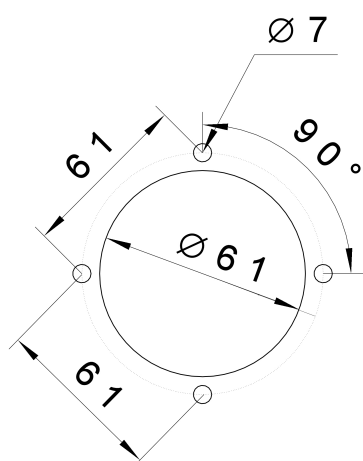
Name	Drawing	EN 50181	Max. Operating voltage	Lightning impulse voltage withstand	Power frequency voltage withstand	Rated current
PTQ 24/630-22	2614	C1				630 A
PTQ 24/630-25	2514	C1	24 kV	125 kV	55 kV	630 A
PTQ 24/250	2615	A1				250 A
PTQ 36/630	2636	C1	36 kV	170 kV	77 kV	630 A
PTQ-cap	2616	---	24kV	125 kV	55 kV	capacitive only

# PTQ

EN 50181 connection bushing



Name	Drawing	Figure	A	B	C	Connection type	Lower connection	Weight (kg)
PTQ 24/630-22	2614	fig.1	196.5	68	Ø22	M16	M10	1.6
PTQ 24/630-25	2514	fig.1	196.5	68	Ø25	M16	M10	1.7
PTQ 24/250	2615	fig.2	151	68	Ø14	Sliding	M8	0.9
PTQ 36/630	2636	fig.1	222	93.5	Ø22	M16	M10	1.7
PTQ-cap	2616	fig.3	130	68	Ø14	---	M8	0.9



## ASSEMBLY INSTRUCTIONS

1. Set the tank as shown on the plan
2. Even out the surface where the gasket will be positioned to improve the sealing.
3. Position the bushing and gasket on the tank.
4. Fasten the PTQ bushing with four M6 screws and washers using a 9-11Nm tightening torque.
5. If the capacitive output is needed use an M4 screw to connect the lateral output, otherwise remember to ground the capacitive output
6. Lower connection has to be screwed (M10) at 30-35 Nm and (M8) at 20-25 Nm tightening torque.

## EN 50181 connection

7. Remove the plastic cap.
8. Clean the connection area.
9. Smoothly cover the connection cone with silicone grease supplied with the cable termination.
10. Connect the cable termination making sure that it abut against the insulator.
11. Be sure that all the safety features are correctly connected to the insulator

# PPE - PPT - PPC

bushing with internal EN 50181 plug in connection

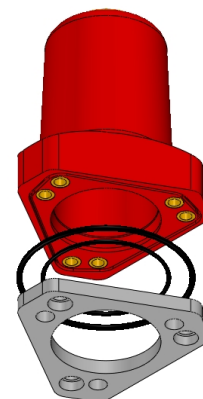
## FEATURES

Red epoxy resin bushing for SF6 gas insulated devices with EN 50181 cable connection.

It is fixed on the tank through OT58 built in brass fittings.

This insulator is supplied with aluminium flange, EPDM O-ring gasket and safety plastic cap for EN 50181 connection.

Version PPC-DC 400-630A has a capacitive outlet and its insulating spacer compatible with our electronic devices.



## STANDARDS

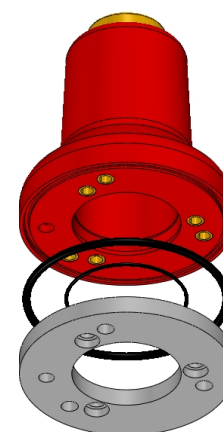
IEC 60137, EN 50181, Enel DJ 1115, Enel DJ 1113, Enel DJ 1153

## ROUTINE TESTS

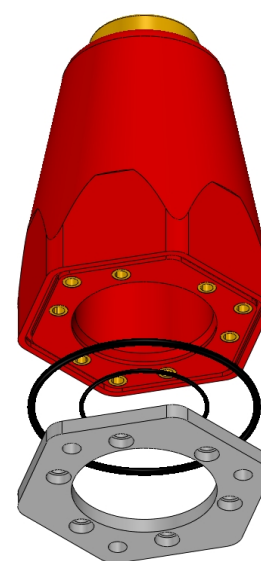
- Visual and dimensional check
- Glass transition temperature
- Dry power frequency voltage withstand test
- Partial discharges
- Leakage test (helium)

## TESTS ON DEMAND

- Dry lightning impulse voltage withstand test

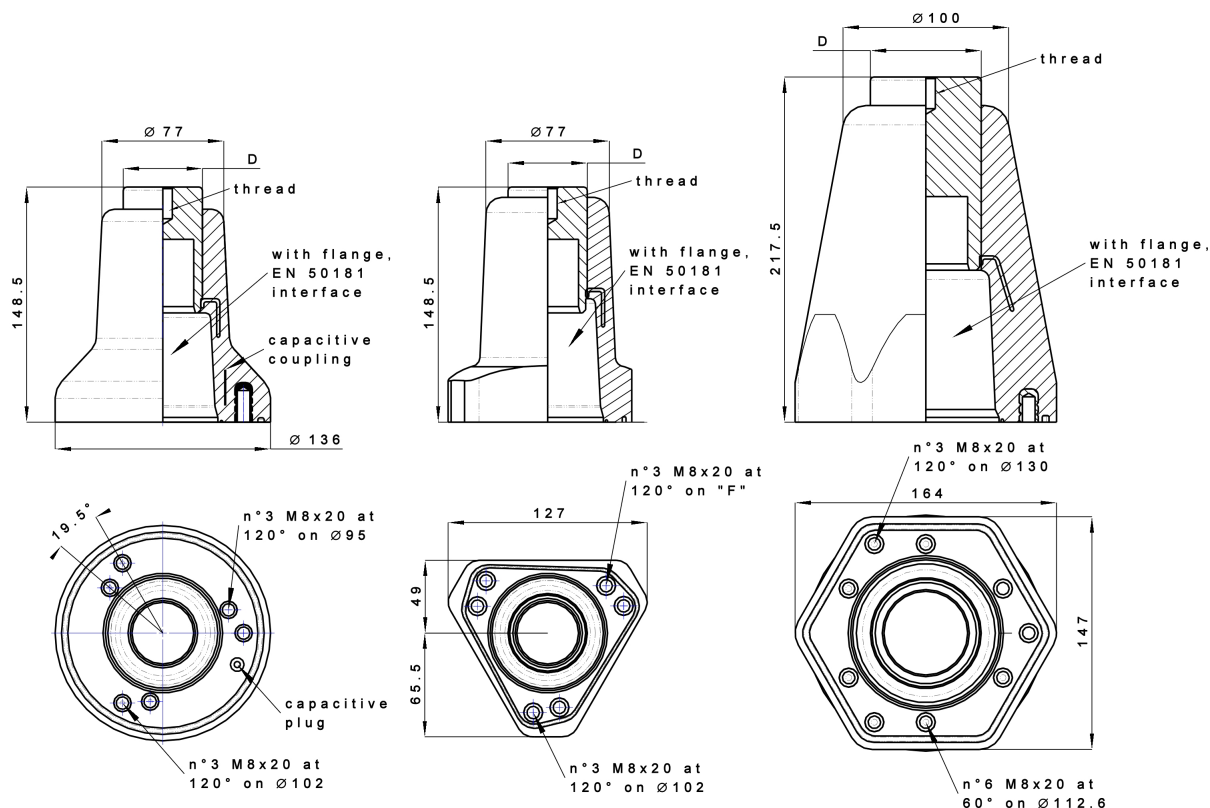


Base	Name	Drawing	EN 50181	Max. Operating voltage	Lightning impulse voltage withstand	Power frequency voltage withstand	Rated current
circular	PPC-DC 36/630	3206	1	36 kV	170 kV	77 kV	400-630 A
triangle	PPT 24/250	3220	0	24 kV	125 kV	55 kV	250 A
	PPT 36/630	3195	1	36 kV	170 kV	77 kV	400-630 A
hexagonal	PPE 24/1250	3227	3	24 kV	125 kV	55 kV	1250 A



# PPE - PPT - PPC

bushing with internal EN 50181 plug in connection



Base	Name	Drawing	EN 50181	Enel Standard	Max. operating voltage	Rated current	D	F	Thread	Weight (kg)
circular	PPC-DC 36/630	3206	1	DJ 1113	36 kV	400-630 A	Ø 45	Ø 95	M12	2.5
triangle	PPT 24/250	3220	0	DJ 1115	24 kV	250 A	Ø 36	Ø 88	M8	1.9
	PPT 36/630	3195	1	DJ 1113	36 kV	400-630 A	Ø 45	Ø 95	M12	2
hexagonal	PPE 24/1250	3227	3	DJ 1153	24 kV	1250 A	Ø 70	Ø 130	M12	5.8

## SUPPLIED WITH

- ✓ FIXING FLANGE for an easier installation of the insulator
- ✓ Internal O-RING gasket
- ✓ External O-RING gasket
- ✓ SCREWS and WASHERS
- ✓ Protective PLASTIC CAP
- ✓ M5 screw and insulating spacer for capacitive outlet connection (available on PPC-DC)



# PGS

bushing air-SF<sub>6</sub>

## FEATURES

Bushing for outdoor applications for SF<sub>6</sub> insulated devices.

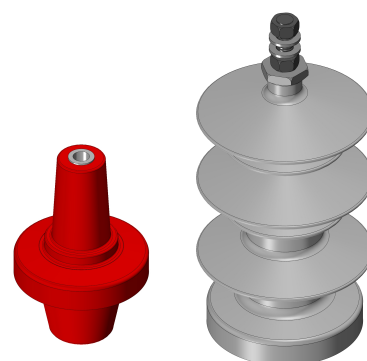
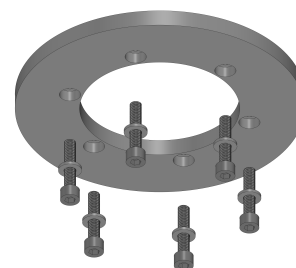
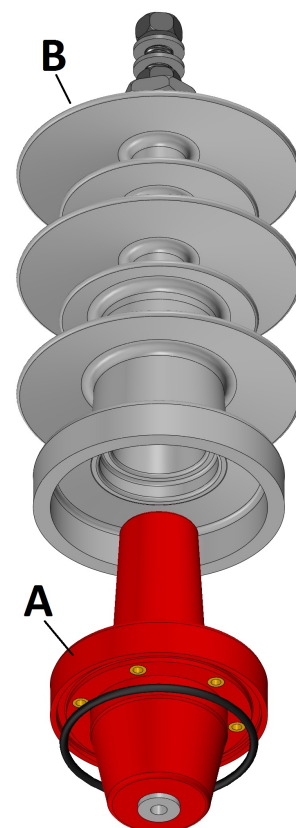
It is composed of two parts: A, red epoxy bushing constitutes the core of the insulator with solid mechanical strength and suitable for SF<sub>6</sub> use. B, silicone rubber cover granting great insulating performances in highly polluted environments.

Resin bushing "A" can be used alone thanks to its EN 50181 C connection. It has to be connected with the silicon cover "B" or with cable termination before putting into operation the electrical equipment

Resin bushing is supplied with an EPDM O-ring gasket and plastic safety cap for C connection cone, while B part is supplied with a small bag of silicone grease and nuts/washers set made of nickel-plated copper for the outdoor cable connection.

It has to be fastened to the tank through six OT58 brass fittings and, upon request, with an aluminium flange that improves stability.

Operating temperature from -25°C to +100°C



## STANDARDS

IEC 60137, IEC 60815, IEC 60507, IEC 61109 (annex C)

## ROUTINE TESTS

- Visual and dimensional check (A&B)
- Glass transition temperature (A)
- Dry power frequency withstand (A)
- Partial discharges (A)
- Gas leakage test (helium) (A)

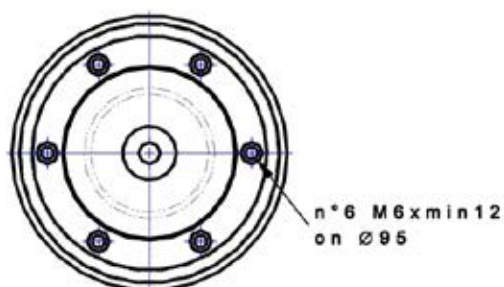
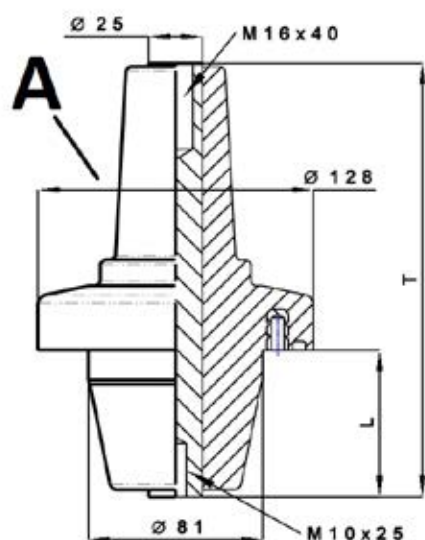
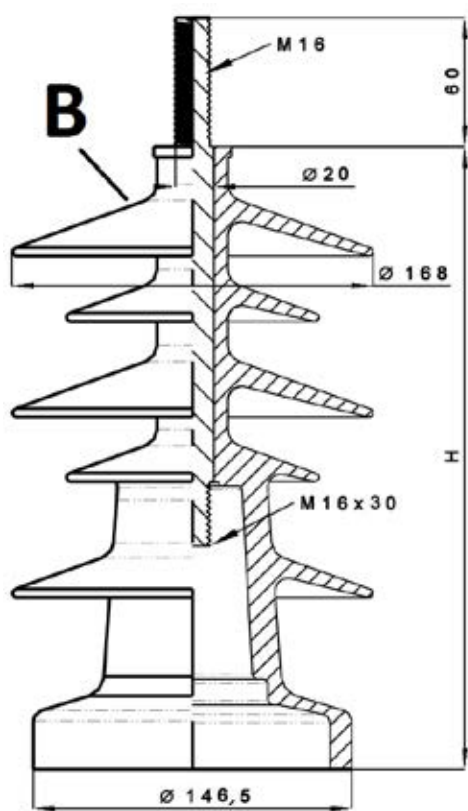
## TESTS ON DEMAND

- Dry lightning impulse voltage (A or A&B)
- Temperature rise test (B)
- Artificial pollution test: 1000h salt fog method (IEC 60507)
- Ageing test under operating voltage, simulating weather conditions – 5000h multiple stresses (IEC 61109)

Name	A	B	Max. Operating voltage	Lightning impulse voltage withstand	Power frequency voltage withstand	Rated current	Creepage distance
PGS 24	1990	cable joint	24 kV	125 kV	55 kV		---
	1990	2000					>780
PGS 36	1990	cable joint	36 kV short type	170 kV	77 kV	630 A	---
	1990	3000					>1050
	1996	cable joint	36 kV long type				
	1996	3000					

# PGS

bushing air-SF<sub>6</sub>

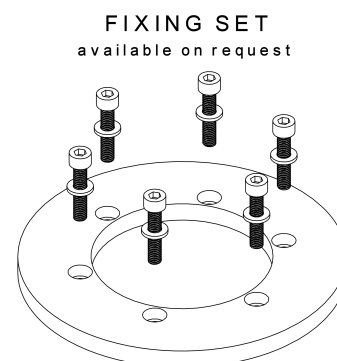
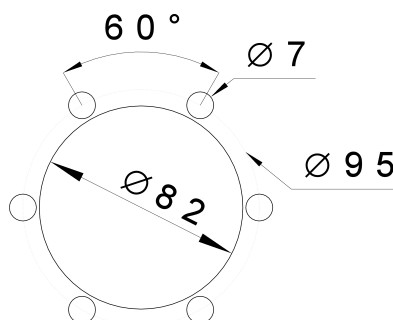


Name	Drawing	L	T	H	Creepage distance	IEC 60815	Weight (kg)
PGS 24/630	1990	68.5	202	---	---	---	2.4
PGS 24G	2000	---	---	292	>780	classe E	1.7
PGS 36/630	1996	108.5	241	---	---	---	2.9
PGS 36G	3000	---	---	360	>1050	classe D	2.2

## ASSEMBLY INSTRUCTION

### Epoxy resin bushing (A)

1. Set the tank as shown on the plan.
2. Remove any insulating material on the holes to guarantee a correct earthing connection of the insulator.
3. Even out the surface where the gasket will be positioned to improve sealing between tank and bushing.
4. Position the bushing and gasket on the tank
5. Fasten the insulator with six screws and washers using a 9-11Nm tightening torque.
6. Lower connection has to be screwed (M10) at 30-35 Nm tightening torque.



### Silicone rubber cover (B)

7. Remove the plastic cap from the resin bushing.
8. Clean with alcohol the C connection cone before coupling it with the silicon cover.
9. After the complete evaporation of the alcohol, spread the grease on the connection cone.
10. Install the silicon cover on the resin bushing screwing up to the bottom. To do so use a hex key with a torque force of 90-100 Nm. The cover has to be considered properly installed when the upper part of the resin bushing is fully covered by the silicon cover.
11. Twist the silicone cover to spread better the grease on the resin bushing.

# IPAR - ISOF

insulators for air-air rotary disconnectors

## FEATURES

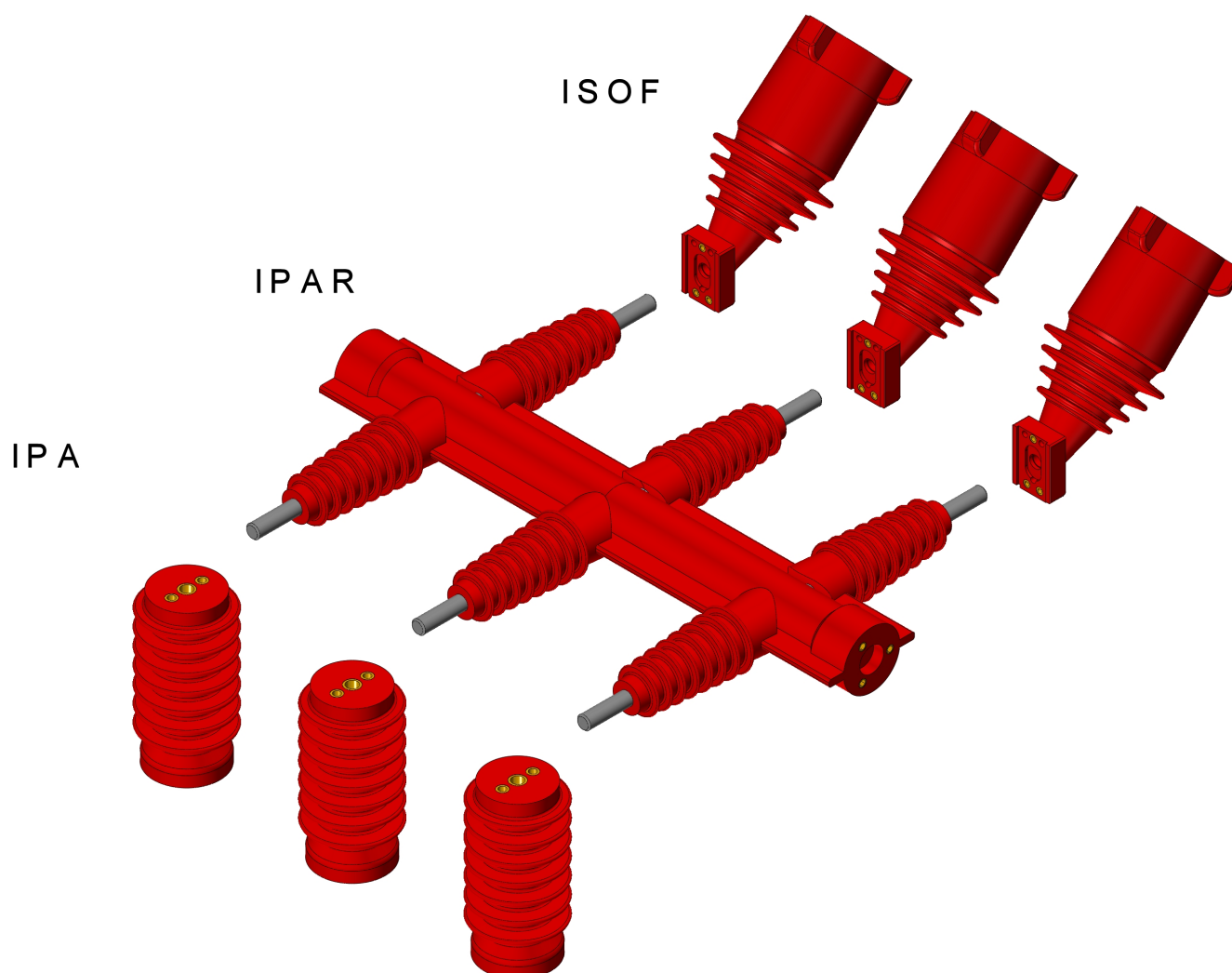
**IPAR** Cast resin monobloc for air-insulated disconnectors. Conductors are made of copper while fittings are made of OT58 brass. This system can cover rated power from 12 kV to 24 kV and rated current from 400A to 630A. All versions have at least 350 mm of creepage distance.

**ISOF** cast resin conductive insulator with arc extinguishing air chamber. The tank and lower contact can be fixed to the insulator through OT58 cast in fittings. Rated up to 24 kV and has a creepage distance of at least 350 mm.

**IPA** Red epoxy resin post insulator for indoor use with OT58 brass fittings. For more information please check the IPA datasheet.

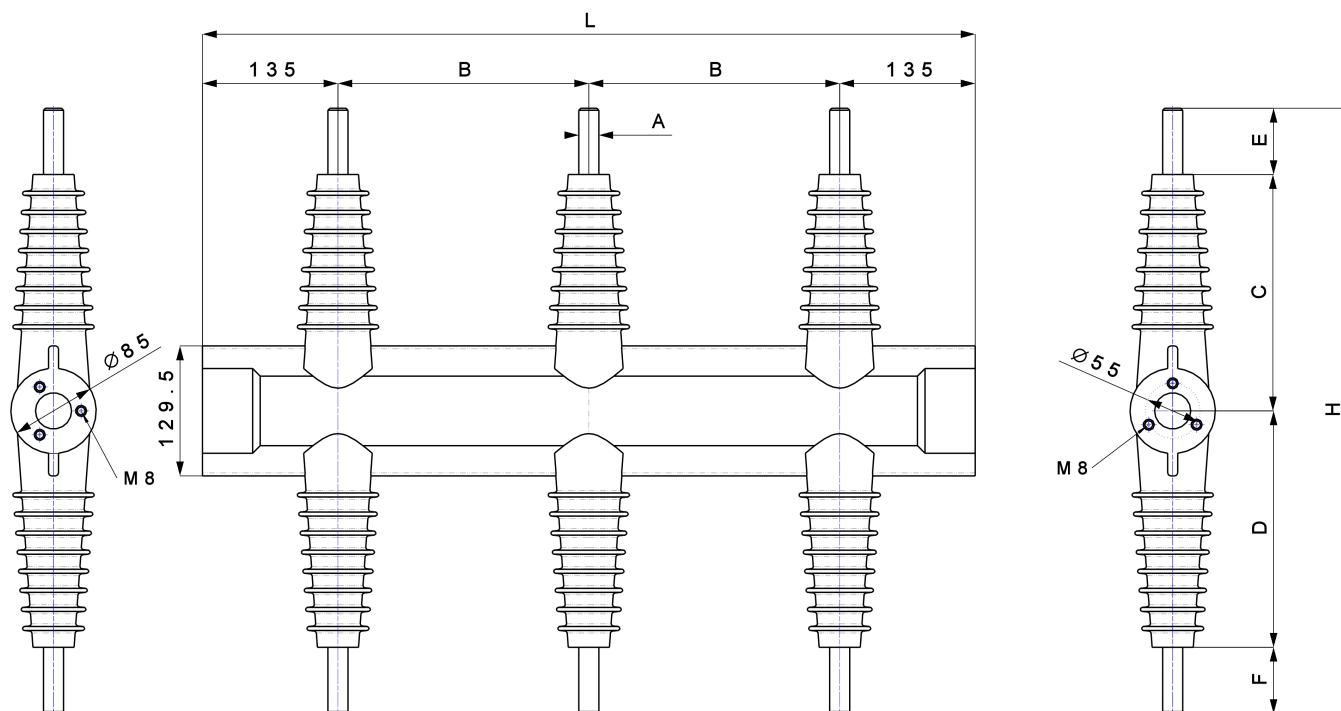
## ROUTINE TESTS

- Visual and dimensional check
- Glass transition temperature
- Charpy pendulum test

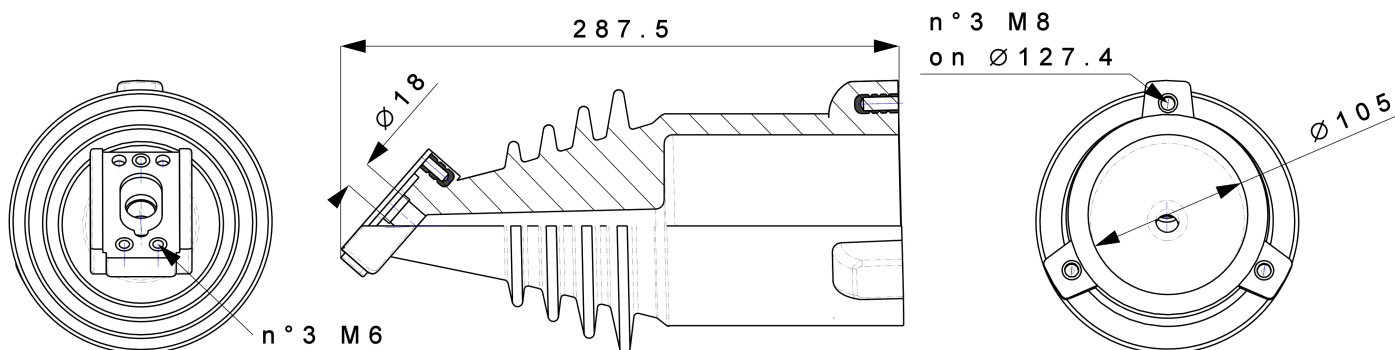


# IPAR - ISOF

insulators for air-air rotary disconnectors



Name	Drawing	Max. operating voltage	Rated current	L	A	B	C	D	E	F	H	Weight (kg)
IPAR 12/400	65012	12 kV	400 A	690	Ø 20 alluminium	210	243	247	48	65	603	11
IPAR 12/630	67012		630 A		Ø 20 copper and silver plated alluminium							
IPAR 24/400	65021	24 kV	400 A	870	Ø 20 alluminium	300	243	247	48	65	603	13
IPAR 24/630	67021		630 A		Ø 20 copper and silver plated alluminium							
IPAR 24/400 ridotto	65016	24 kV	400 A	770	Ø 16 copper	250	200	200	40	40	480	10



CT118 rev.0 del 18/07/2017

# PRC

spout insulators

## FEATURES

Cast resin spout insulator used to improve insulation of busbars for air/air electric equipment.

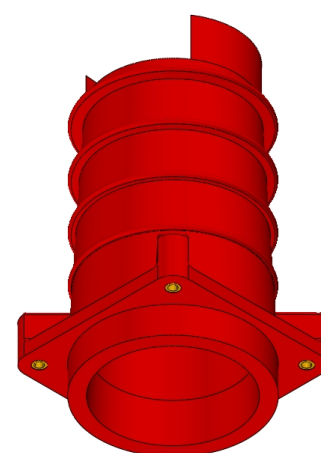
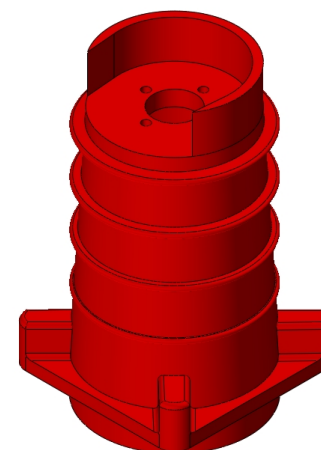
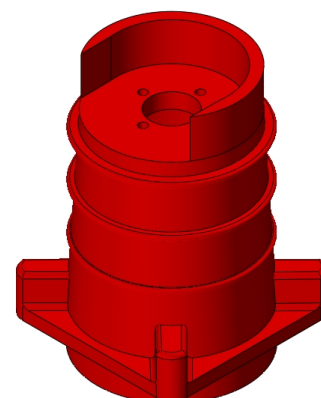
It is made of red coloured epoxy resin for indoor use with OT58 brass fittings.

Operating temperature from -25°C to +100°C.

## ROUTINE TESTS

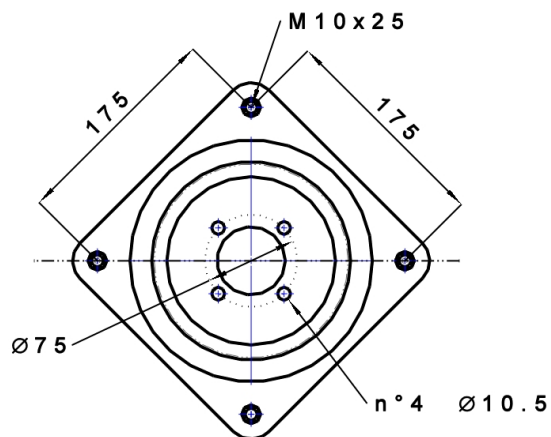
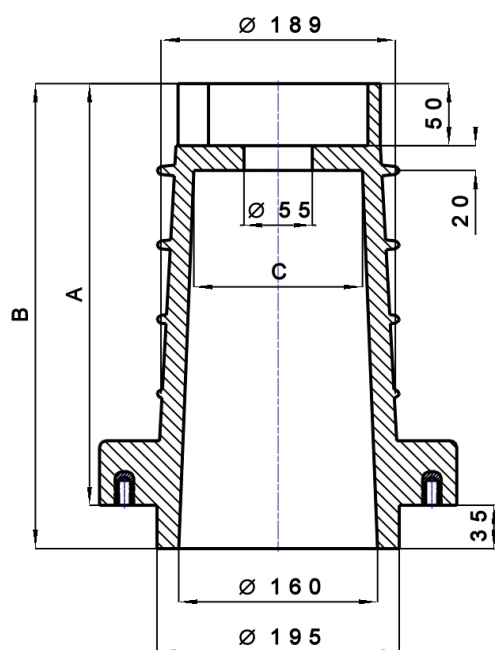
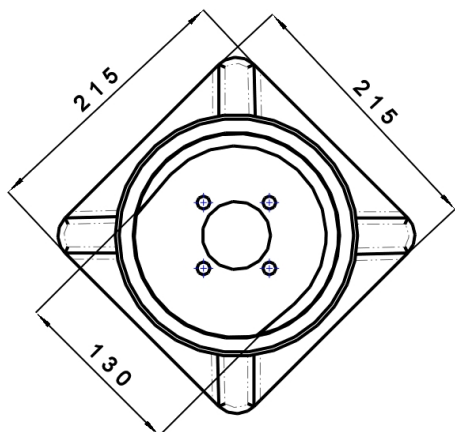
- Visual and dimensional check
- Glass transition temperature

Name	Drawing	Max. operating voltage	Lighting impulse voltage withstand	Power frequency voltage withstand	Creepage distance
PRC 12	86010	12 kV	75 kV	30 kV	210
PRC 17	87015	17.5 kV	95 kV	42 kV	280
PRC 24	88020	24 kV	125 kV	55 kV	345
PRC 36	89030	36 kV	170 kV	77 kV	430



# PRC

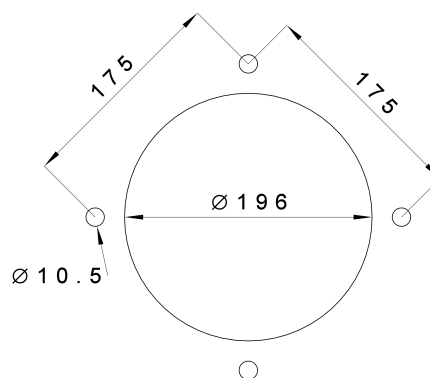
spout insulators



Name	Drawing	A	B	C	Creepage distance	Weight (kg)
PRC 12	86010	170	275	Ø 145	210	6
PRC 17	87015	230	335	Ø 140	280	7
PRC 24	88020	290	395	Ø 135	345	8
PRC 36	89030	350	455	Ø 130	430	9

## ASSEMBLY INSTRUCTIONS

1. Set the tank as shown below



2. Place the insulator on the tank.
3. Fix the insulator using four screws and washers with a 30 Nm tightening torque.
4. Once the insulator is set, place the conductor.

# PTS

bushing EN 50181

## FEATURES

Red epoxy resin bushing for SF6 gas insulated devices with EN 50181 cable connection.

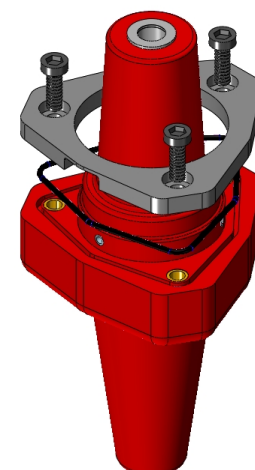
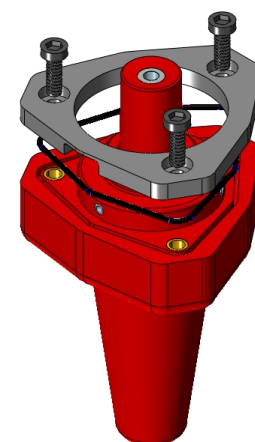
It is fastened on the tank through OT58 built in brass fittings.

This insulator has a lateral capacitive outlet and it is supplied with an EPDM O-ring gasket and safety plastic cap for EN 50181 connection.

It is supplied with fastening set including: aluminum flange (with eyelets for 250A and 400A versions), screws, washers and insulating spacer for the capacitive output.

PTS bushings has the same frame as its female versions PPC e PPT.

Operating temperature from -25°C to +100°C.



## STANDARDS

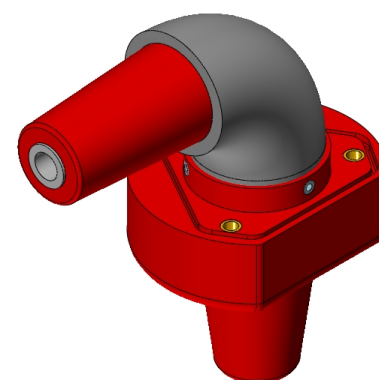
EN 50181, IEC 60137

## ROUTINE TESTS

- Visual and dimensional check
- Glass transition temperature
- Dry power frequency voltage withstand test
- Partial discharges
- Leakage test (helium)

## TESTS ON DEMAND

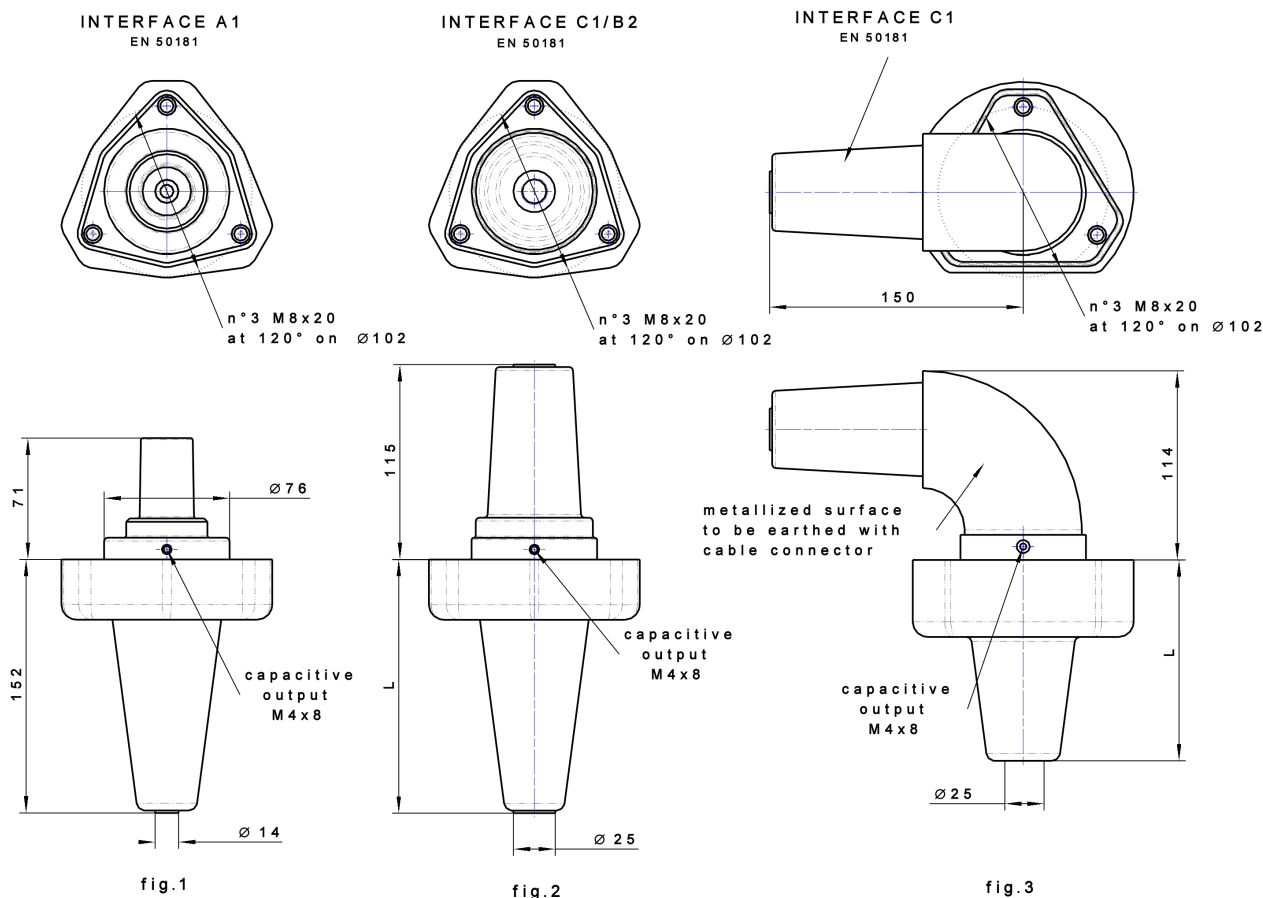
- Dry lightning impulse voltage withstand test



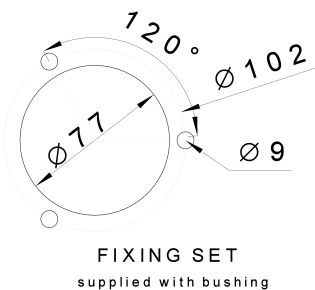
Name	Drawing	EN 50181	Max. Operating voltage	Lightning impulse voltage withstand	Power frequency voltage withstand	Rated current
PTS 24/250	1921	A1	24 kV	125 kV	55 kV	250 A
PTS 24/630	1925 M	C1				630 A
PTS 36/400	1942	B2	36 kV	170 kV	77 kV	400 A
PTS 36/630	1925	C1				630 A
PTS 24/630	1929	C1	24kV	125 kV	55 kV	630 A
PTS 36/630	1236	C1	36kV	170 kV	77 kV	630 A

# PTS

bushing EN 50181



Name	Drawing	Figure	Connection type	Lower connection	L	Weight (kg)
PTS 24/250	1921	fig.1	Sliding	M8	152	1.4
PTS 24/630	1925 M	fig.2	M16	M12	122	2.2
PTS 36/400	1942		Sliding	M8	152	2.4
PTS 36/630	1925	fig.3	M16	M12	152	2.4
PTS 24/630	1929		M16	M12	122	3.2
PTS 36/630	1236		M16	M8	152	3.4

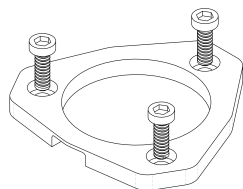


## ASSEMBLY INSTRUCTIONS

1. Set the tank as shown on the plan
2. Even out the surface where the gasket will be positioned to improve the sealing.
3. Position the bushing and gasket on the tank, use the aluminium flange if necessary.
4. Fasten the PTS bushing with three M6 screws and washers using a 9-11Nm tightening torque.
5. If the capacitive output is needed, please remember to set the nylon washer first and then tighten the M4 screw to the output. Otherwise, remember to ground it.
6. Lower connection has to be screwed (M10) at 30-35 Nm and (M8) at 20-25 Nm tightening torque

### EN 50181 connection

7. Remove the plastic cap.
8. Clean the connection area.
9. Smoothly cover the connection cone with silicone grease supplied with the cable termination.
10. Connect the cable termination making sure that it abut against the insulator.
11. Be sure that all the safety features are correctly connected to the insulator.



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# PSE - PSL

indoor / outdoor bushing

## FEATURES

Cast resin bushing for indoor/outdoor applications. It is made of cycloaliphatic resin with OT58 brass fittings.

This bushing is supplied with:

- ✓ Brass nuts and washers
- ✓ NBR Oring sealing gasket.
- ✓ Screws and washers to secure the bushing to the tank.

It is used to link two Medium Voltage air insulated ends in an indoor/outdoor system.

Operating temperature from -25°C to +100°C.

## STANDARDS

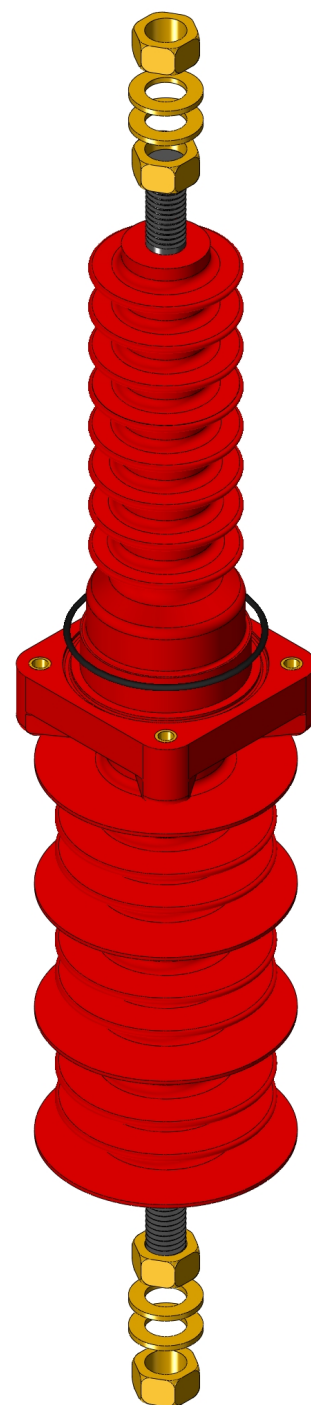
IEC 60137 , Enel 3053C (PSL only)

## ROUTINE TESTS

- Visual and dimensional check
- Glass transition temperature
- Dry power frequency withstand
- Partial discharges

## TESTS ON DEMAND

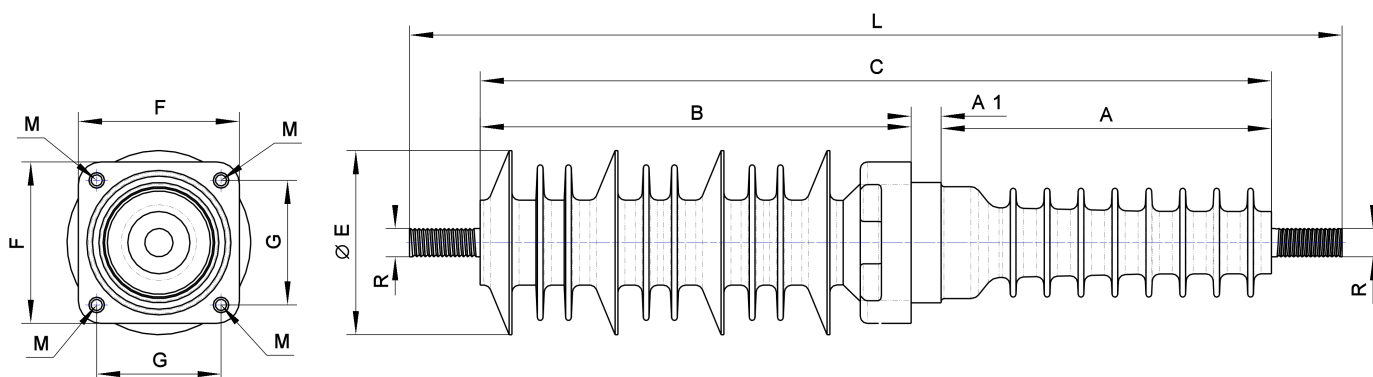
- Dry lightning impulse voltage
- Bending stress
- High temperature test



Name	Drawing	Max. operating voltage	Lighting impulse voltage withstand	Power frequency voltage withstand	Rated current
PSE 12/250	71010	12 kV	75 kV	30 kV	250 A
PSE 12/400	71011				400 A
PSE 12/630	71012				630 A
PSE 12/800	71013				800 A
PSE 17/250	72010	17.5 kV	95 kV	42 kV	250 A
PSE 17/400	72011				400 A
PSE 17/630	72012				630 A
PSE 17/800	72013				800 A
PSE 24/250	73010	24 kV	125 kV	55 kV	250 A
PSE 24/400	73011				400 A
PSE 24/630	73012				630 A
PSE 24/800	73013				800 A
PSE 36/250	74010	36 kV	170 kV	77 kV	250 A
PSE 36/400	74011				400 A
PSE 36/630	74012				630 A
PSE 36/800	74013				800 A
PSE 36/1000	74014				1000 A
PSL 24/400 ENEL 3053C	73016	24 kV	125 kV	55 kV	400 A

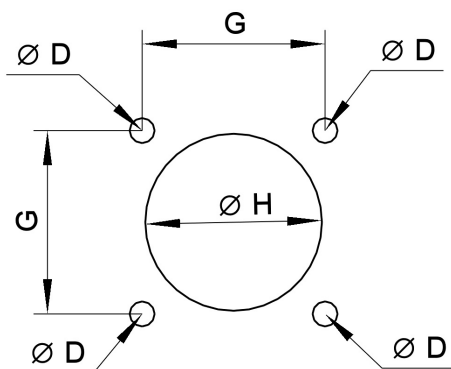
# PSE - PSL

indoor / outdoor bushing



Name	Drawing	A	A1	B	C	D	E	F	G	H	L	M	R - thread			Weight (kg)	Creep age distance (outside section)
													Diameter	Pitch	Length		
PSE 12/250	71010	91	18	161	270	8.5	130	113.5	88	87	380	M8x20	12	1.5	45	3.1	>350
PSE 12/400	71011	91	18	161	270	8.5	130	113.5	88	87	380	M8x20	16	1.5	45	3.4	>350
PSE 12/630	71012	91	18	161	270	8.5	130	113.5	88	87	380	M8x20	20	1.5	45	3.7	>350
PSE 12/800	71013	91	18	161	270	8.5	130	113.5	88	87	380	M8x20	24	2	45	4.1	>350
PSE 17/250	72010	156	18	226	400	8.5	130	113.5	88	87	510	M8x20	12	1.5	45	4.1	>542.5
PSE 17/400	72011	156	18	226	400	8.5	130	113.5	88	87	510	M8x20	16	1.5	45	4.5	>542.5
PSE 17/630	72012	156	18	226	400	8.5	130	113.5	88	87	510	M8x20	20	1.5	45	4.9	>542.5
PSE 17/800	72013	156	18	226	400	8.5	130	113.5	88	87	510	M8x20	24	2	45	5.4	>542.5
PSE 24/250	73010	230	18	302	550	8.5	130	113.5	88	87	660	M8x20	12	1.5	45	5.2	>744
PSE 24/400	73011	230	18	302	550	8.5	130	113.5	88	87	660	M8x20	16	1.5	45	5.6	>744
PSE 24/630	73012	230	18	302	550	8.5	130	113.5	88	87	660	M8x20	20	1.5	45	6.2	>744
PSE 24/800	73013	230	18	302	550	8.5	130	113.5	88	87	660	M8x20	24	2	45	6.8	>744
PSE 36/250	74010	365	40	405	810	10.5	159	160	120	118	940	M10x20	12	1.5	60	10.7	>860
PSE 36/400	74011	365	40	405	810	10.5	159	160	120	118	940	M10x20	16	1.5	60	11.2	>860
PSE 36/630	74012	365	40	405	810	10.5	159	160	120	118	940	M10x20	20	1.5	60	12	>860
PSE 36/800	74013	365	40	405	810	10.5	159	160	120	118	960	M10x20	24	2	70	13	>860
PSE 36/1000	74014	365	40	405	810	10.5	159	160	120	118	960	M10x20	30	2	70	14.7	>860
PSL 24/400 ENEL 3053C	73016	230	323	302	855	8.5	130	113.5	88	87	965	M8x20	16	1.5	45	8.9	>744

## ASSEMBLY INSTRUCTIONS



1. Set the tank as shown on the plan
2. Even out the surface where the gasket will be positioned to improve the sealing.
3. Position the bushing and gasket on the tank.
4. Secure the bushing with torque force of 19-21Nm for M8 inserts and 29-31 Nm for M10.
5. Connect the bushing to the busbar using the supplied hardware. Be careful not to lean the hardware against the resin. Use an adequate torque for this procedure.

# INV - IPF - IPC

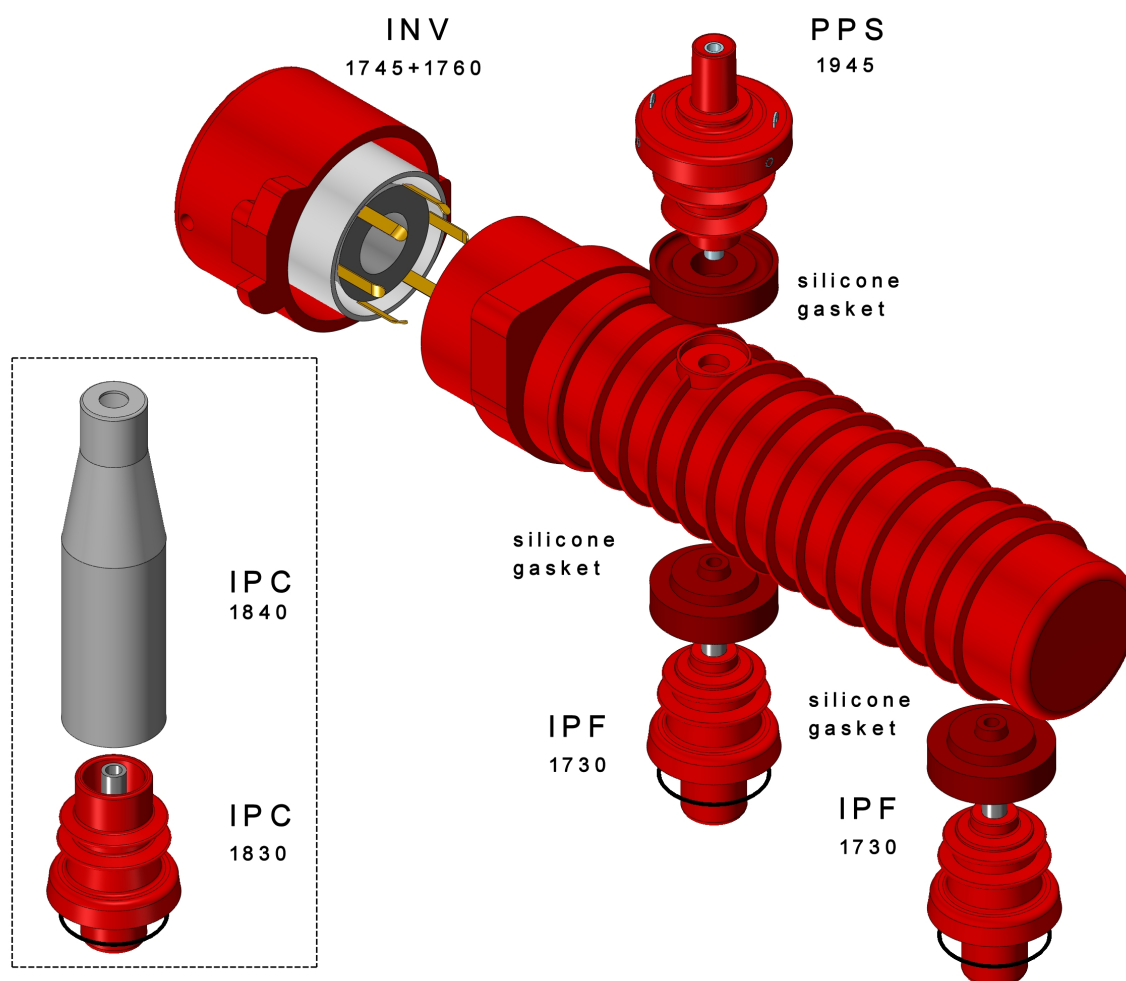
fuse holder system for SF<sub>6</sub> gas insulated switchgears

## FEATURES

**INV 1745+1760** red epoxy resin fuse holder, supplied with contacts, gasket and sealing epoxy resin cover.

**IPF 1730** epoxy resin bushing conceived to support the fuse holder, it is supplied with O-ring gasket.

**IPC 1830** epoxy resin for cable testing supplied with O-ring gasket and, upon request, with a silicone rubber extension (IPC 1840).



### ROUTINE TEST (ALL COMPONENTS)

- Visual and dimensional check
- Glass transition temperature

### IPC ROUTINE TEST

- Gas leakage test (helium)

### IPF ROUTINE TEST

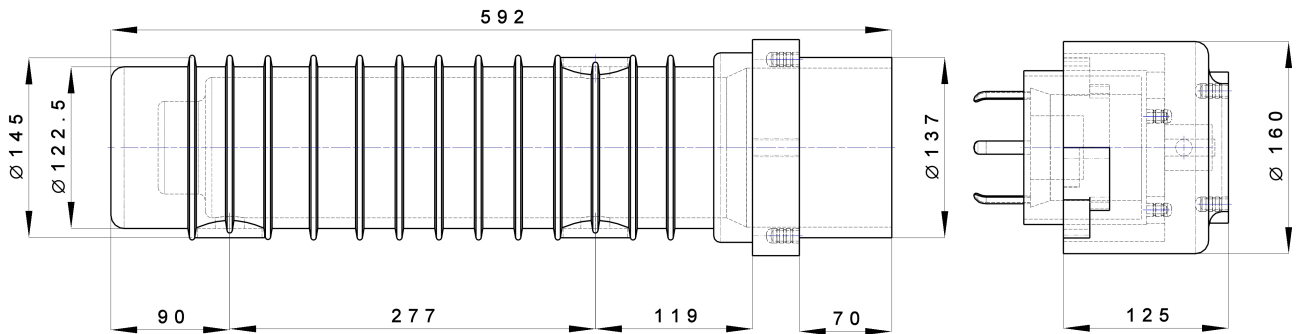
- Gas leakage test (helium)
- Dry lightning impulse voltage
- Partial discharges

### PPS ROUTINE TEST

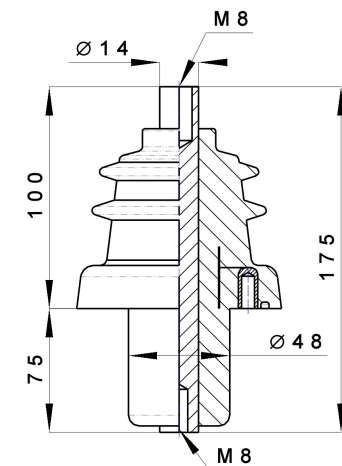
- Dry power frequency withstand
- Partial discharges

# INV - IPF - IPC

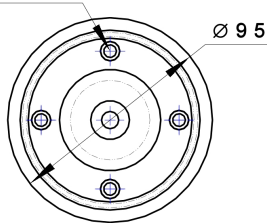
fuse holder system for SF<sub>6</sub> gas insulated switchgears



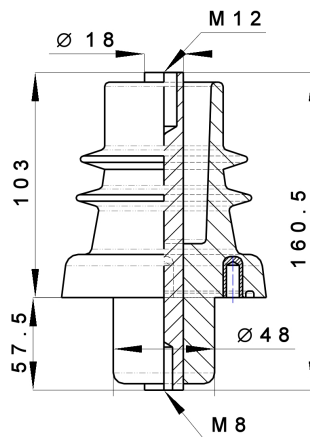
Name	Drawing	Max. operating voltage	Lighting impulse voltage withstand	Power frequency voltage withstand	Rated current	Weight (kg)
INV 24	1745 + 1760	24 kV	125 kV	55 kV	200 A	14



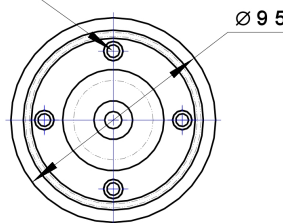
n° 4 M6  
on Ø 64



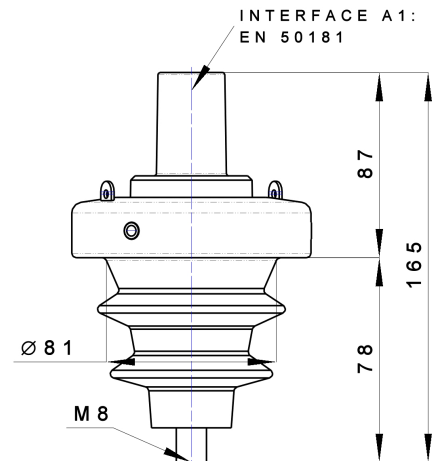
IPF



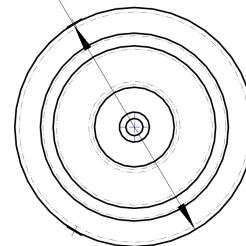
n° 4 M6  
on Ø 64



IPC



Ø 111



PPS

Name	Drawing	Max. operating voltage	Lighting impulse voltage withstand	Power frequency voltage withstand	Rated current	Weight (kg)
IPF	1730	24 kV	125 kV	55 kV	250 A	1
IPC	1830				500A	1
PPS	1945				250 A	1.1

CT122 rev.0 del 18/07/2017

# TBR - 250A

EN 50180 transformer bushing

## FEATURES

Epoxy resin bushings for oil transformers with plug-in cable connection in compliance with EN 50180.

All versions include: plastic cap on cable connection, fixing hardware for lower connection, screen earthing plaque with its screw.

Earthing cable is available as an alternative to the plaque.

On request is also available the fixing system in compliance with EN 50180-2/3:

- ✓ Aluminium flange
- ✓ NBR gasket
- ✓ Stainless steel washers
- ✓ Stainless steel nuts

## REFERENCE STANDARDS

IEC 60137, EN 50180

## ROUTINE TESTS

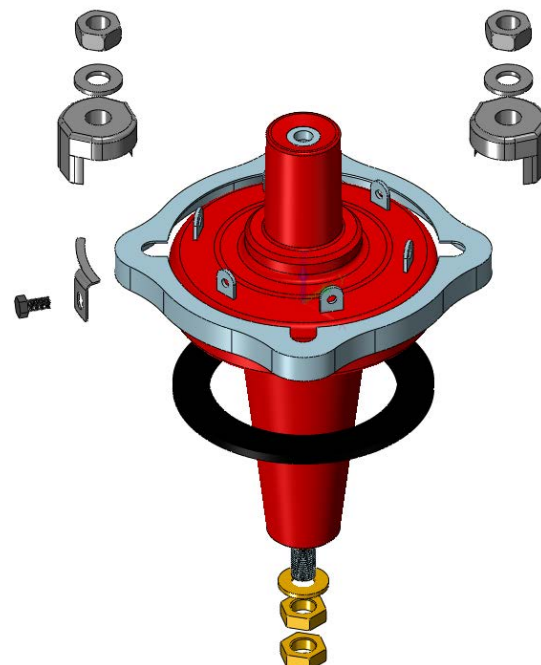
- Visual and dimensional check
- Glass transition temperature
- Dry power frequency withstand
- Partial discharges

## TESTS ON DEMAND

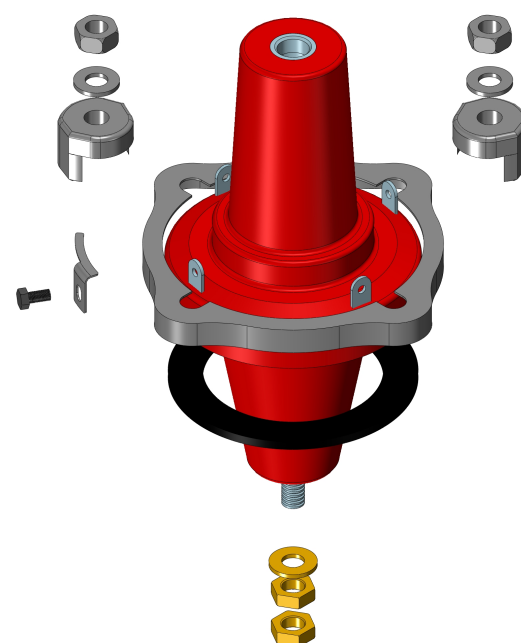
- Dry lightning impulse voltage
- Bending stress
- High temperature test

Name	Drawing	Interface EN 50180	Max. operating voltage	Lightning impulse voltage withstand	Power frequency voltage withstand	Nominal current
TBR 24/250 ridotto	92310	A1	24 kV	125 kV	55 kV	250 A
TBR 24/250	92315					
TBR 36/250	92410	B1	36 kV	170 kV	77 kV	250 A

### 250A - INTERFACE A1

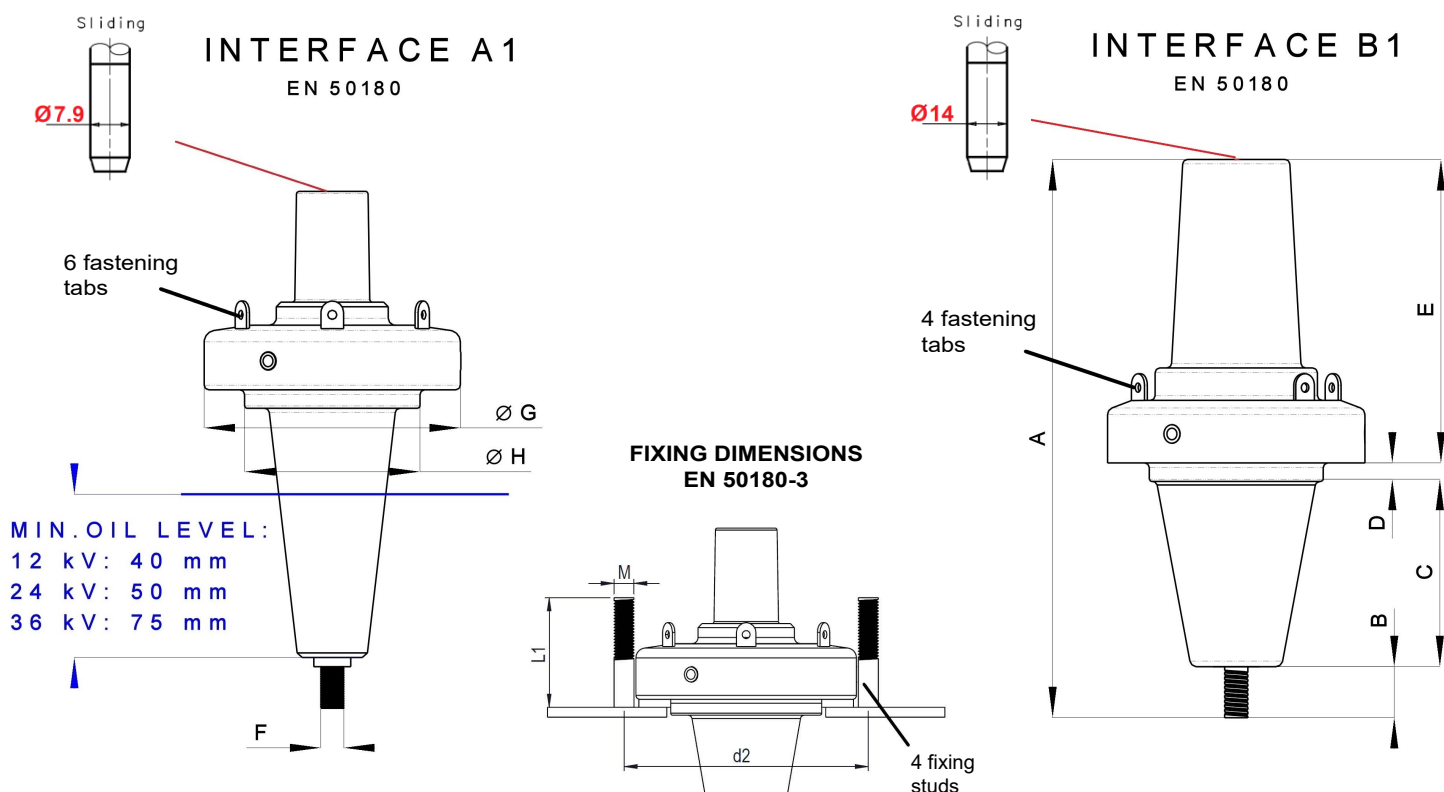


### 250A - INTERFACE B1



# TBR - 250A

EN 50180 transformer bushing



Name.	Drawing	Interface EN 50180	A	B	C	D	E	F	G	H	M	d2	L1 (min)	Connect. type	Weight (kg)
<b>TBR 24/250 reduced</b>	92310	A1	189	22	73	8	86	M16	Ø111	Ø76	10	Ø123	55	Sliding PIN Ø7.9	1.1
<b>TBR 24/250</b>	92315	A1	224	22	108	8	86	M16	Ø111	Ø76	10	Ø123	55	Sliding PIN Ø7.9	1.3
<b>TBR 36/250</b>	92410	B1	241	22	80	8	131	M16	Ø111	Ø76	10	Ø123	55	Sliding PIN Ø14	1.5

## ASSEMBLY INSTRUCTIONS

1. Place the bushing on the top of the transformers tank using its NBR gasket.
2. At least one of the three screen outlets should be connected to the earth with the plaque or earthing cable.
3. Use the fixing hardware to secure the bushing to the tank with a torque force of 10÷15 Nm

## EN 50180 Cable termination

4. Remove the safety cap
5. Clean the connection area
6. Smoothly cover the connection cone with silicone grease supplied with the cable termination
7. Connect the cable termination making sure that it abut against the insulator.
8. Be sure that all the safety features are correctly connected to the insulator.

## BE AWARE OF:

- ✓ Do not paint or damage the cable connection.
- ✓ Cover the bushing with its safety cap when it is not connected to the cable termination

CT123 rev.1 del 27/02/2019

# TBR - 400/630/1250A

EN 50180 transformer bushing

## FEATURES

Epoxy resin bushings for oil transformers with plug-in cable connection in compliance with EN 50180.

All versions include: plastic cap on cable connection, fixing hardware for lower connection, screen earthing plaque with its screw.

Earthing cable is available as an alternative to the plaque.

On request is also available the fixing system in compliance with EN 50180-2/3:

- ✓ Aluminium flange
- ✓ NBR gasket
- ✓ Stainless steel washers
- ✓ Stainless steel nuts

## REFERENCE STANDARDS

IEC 60137, EN 50180

## ROUTINE TESTS

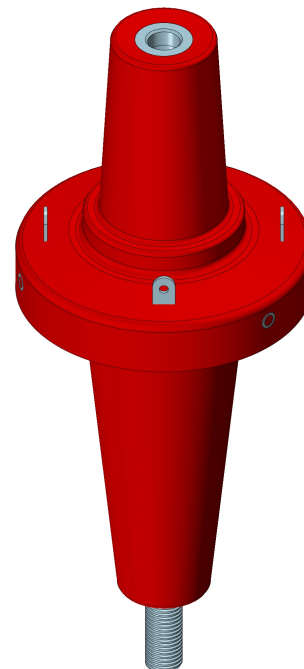
- Visual and dimensional check
- Glass transition temperature
- Dry power frequency withstand
- Partial discharges

## TESTS ON DEMAND

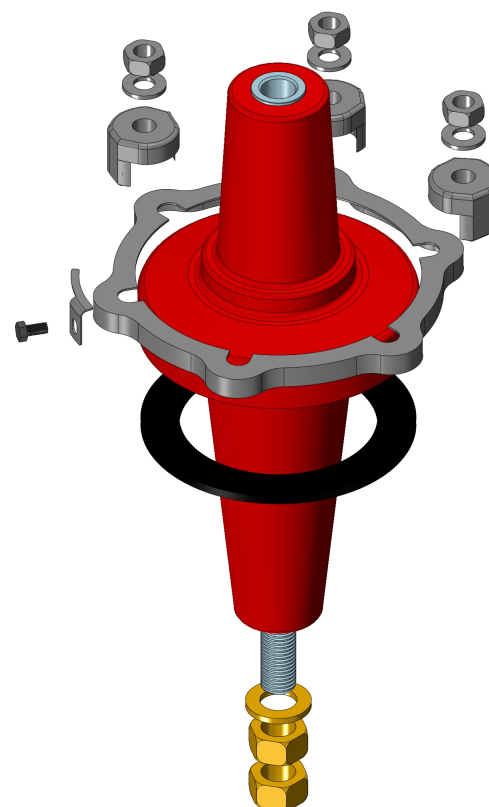
- Dry lightning impulse voltage
- Bending stress
- Temperature rise test

Name	Drawing	Interface EN 50180	Max. operating voltage	Lightning impulse voltage withstand	Power frequency voltage withstand	Nominal current
TBR 36/400	92420	B2	36 kV	170 kV	77 kV	400 A
TBR 36/630	92430	C1				630 A
TBR 36/1250	92461	C2				1250 A

### 400A - INTERFACE B2

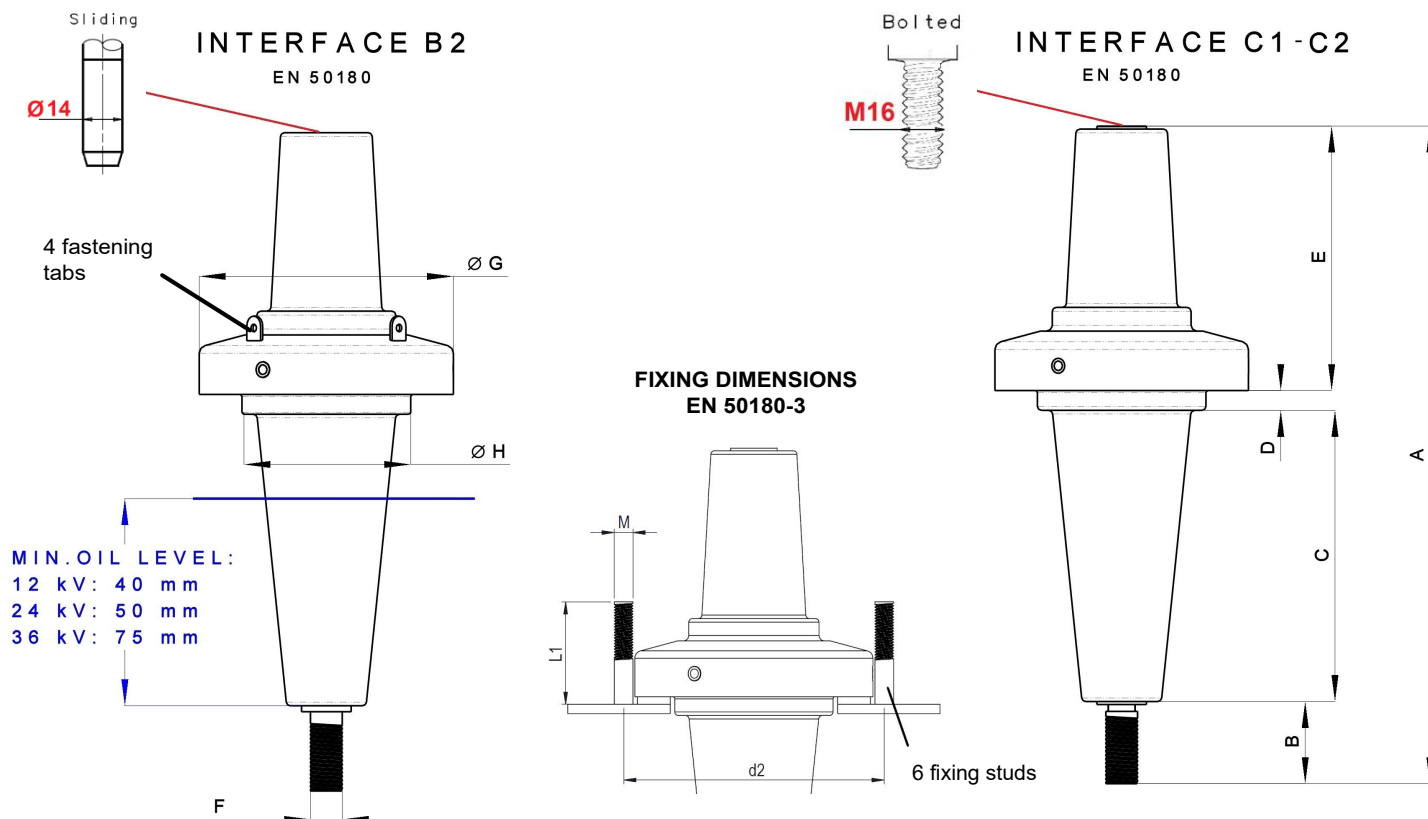


### 630A - INTERFACE C1 1250A - INTERFACE C2



# TBR - 400/630/1250A

EN 50180 transformer bushing



Name	Drawing	Interface EN 50180	A	B	C	D	E	F	G	H	M	d2	L1 (min)	Connection type	Weight (kg)
TBR 36/400	92420	B2	332.5	41.5	147	10	132	M16	Ø128	Ø87	10	Ø140	55	Sliding PIN Ø14	2.7
TBR 36/630	92430	C1	334	41.5	147	10	133.5	M16	Ø128	Ø87	10	Ø140	55	Bolted M16	2.9
TBR 36/1250	92461	C2	329	41.5	138	10	139.5	M16	Ø150	Ø100	12	Ø171 Ø180	65	Bolted M16	3.9

## ASSEMBLY INSTRUCTIONS

1. Place the bushing on the top of the transformers tank using its NBR gasket.
2. At least one of the three screen outlets should be connected to the earth with the plaque or earthing cable.
3. Use the fixing hardware to secure the bushing to the tank with a torque force of 10÷15 Nm

## EN 50180 Cable termination

4. Remove the safety cap
5. Clean the connection area
6. Smoothly cover the connection cone with silicone grease supplied with the cable termination
7. Connect the cable termination making sure that it abut against the insulator.
8. Be sure that all the safety features are correctly connected to the insulator.

## BE AWARE OF:

- ✓ Do not paint or damage the cable connection.
- ✓ Cover the bushing with its safety cap when it is not connected to the cable termination



# TBS - 250A

EN 50180 transformer bushing

## FEATURES

Bushing for outdoor applications in oil insulated transformers.

This bushing has an epoxy resin core that ensures good mechanical performances and excellent insulation level. The external coating consists of liquid silicone rubber co-moulded on the core that guarantees excellent resistance to degradation caused by atmospheric agents (sandstorms, UV radiations, saline environment, industrial pollution...).

The insulator is provided with an aluminium flange for fixing to no°4 M10 studs of the transformer carpentry.

The electric field inside the insulator is controlled by a metal shield. This shield must normally be connected to earth by means of the set included in the supply of the insulator, but it can be used to pick up a voltage presence signal, using a special kit supplied separately only on request.

Every bushing is supplied with:

- ✓ Nickel-plated brass nuts and washers for air side connection (M12)
- ✓ Nuts and washers in brass for the oil side connection (M12)
- ✓ Cork rubber seal
- ✓ Screen grounding set
- ✓ Nickel-plated brass cap, prepared for anchoring spark-gap horns
- ✓ Nuts and washers in stainless steel for fixing to the transformer studs (M10)

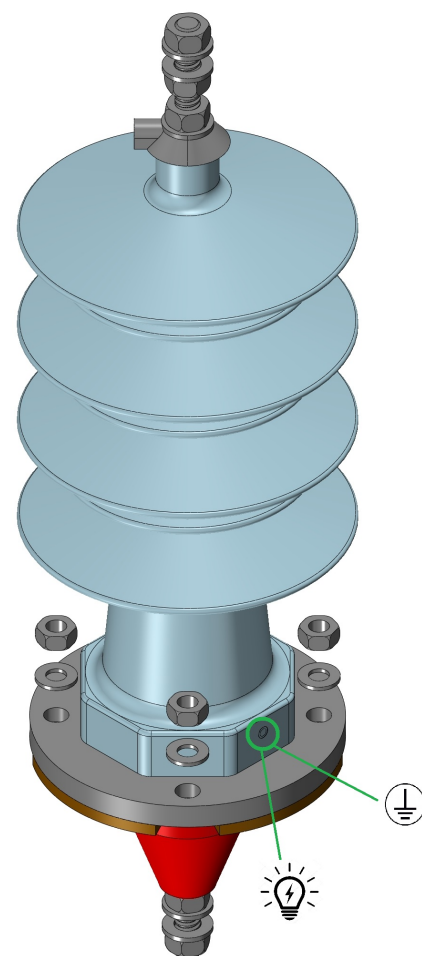
**REFERENCE STANDARDS** EN 50180, IEC 60815, IEC 60137

## ROUTINE TESTS

- Visual and dimensional check
- Glass transition temperature
- Dry power frequency withstand voltage test
- Partial discharges

## TESTS ON DEMAND

- Dry lightning impulse withstand voltage test
- Bending stress test
- Temperature rise test



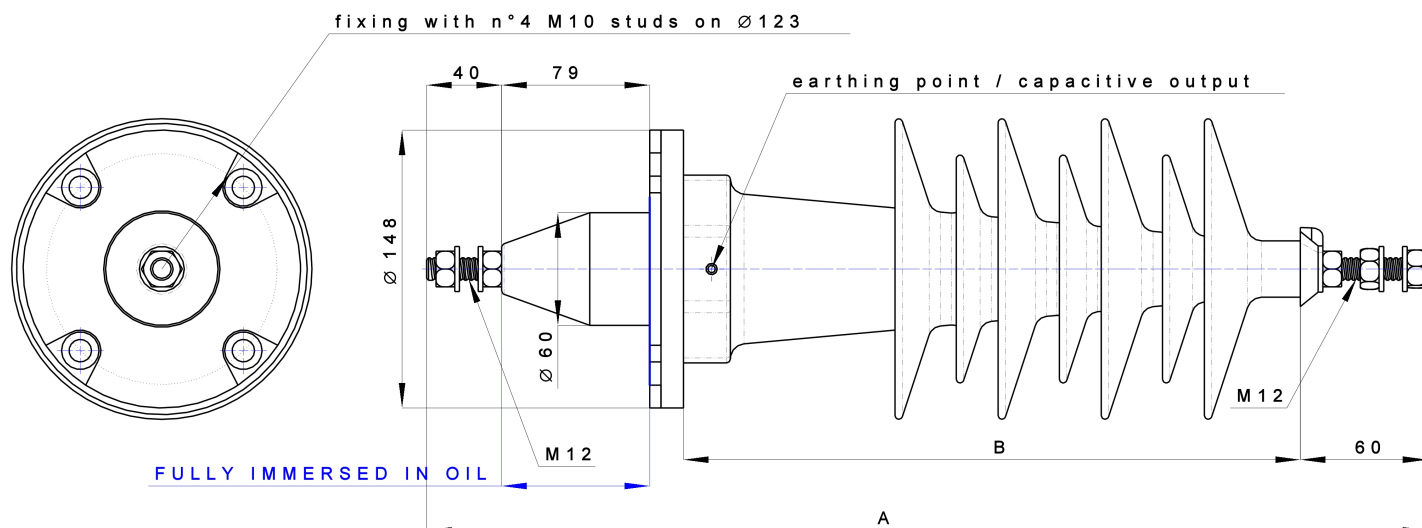
## MAINTENANCE FREE !

- ✓ good impact and shock resistance
- ✓ easy and quick assembly
- ✓ 100% guaranteed partial discharges
- ✓ **NO OIL IN THE BUSHING BODY** = reduced possibility of loss and consequent fire
- ✓ low need of periodic cleaning

EN 50180 type	Creepage distance (mm)	Drawing	Code	Max. operating voltage	Lightning impulse voltage withstand	Power frequency voltage withstand	Nominal current
12-250/P4	710	95314	95110	12kV	75kV	30kV	250A
24-250/P2	710	95314	95314	24kV	125kV	55kV	
24-250/P3	920	95312	95312				
24-250/VI	1175	95313	95313				
24-250/P4	1320	95414	95315				
36-250/P1	920	95312	95412	36kV	170kV	77kV	
36-250/VI	1175	95313	95413				
36-250/P4	1320	95414	95414				

# TBS - 250A

EN 50180 transformer bushing



EN 50180 type	Creepage distance (mm)	Arching distance (mm)	Drawing	Code	Max. operating voltage	A	B	N° fins	Weight (kg)
12-250/P4	710	290	95314	95110	12kV	492	295	5	3.6
24-250/P2	710	290	95314	95314	24kV	492	295	5	3.6
24-250/P3	920	330	95312	95312		534	337	7	3.9
24-250/VI	1175	395	95313	95313		589	392	9	4.3
24-250/P4	1320	485	95414	95315		709	512	9	5.5
36-250/P1	920	330	95312	95412	36kV	534	337	7	3.9
36-250/VI	1175	395	95313	95413		589	392	9	4.3
36-250/P4	1320	485	95414	95414		709	512	9	5.5

## ASSEMBLY INSTRUCTIONS

- 1) Drill the transformer box with a min. hole.  $\varnothing 80$ , as required by EN 50180
- 2) Weld to the transformer box n°4 M10 studs at 90° on  $\varnothing 123$  diameter - as foreseen by EN 50180
- 3) Eliminate any defect on the surface on which the seal must seal
- 4) Place the cork rubber seal
- 5) Position the insulator fixed to the flange, inserting the resin part into the  $\varnothing 80$  hole and inserting the n°4 studs into the flange holes
- 6) If you DO NOT want to use the capacitive voltage presence signal, connect the shield output to one of the studs using the earthing cable supplied with the isolator
- 7) Tighten the flange on the studs using the washers and nuts provided (recommended tightening torque of 10- 15Nm)
- 8) Connect the conductor to the air termination
- 9) Connect the conductor to the oil termination

CT125 rev.0 del 01/06/2018

# TBS- 630A

EN 50180 transformer bushing

## FEATURES

Bushing for outdoor applications in oil insulated transformers.

This bushing has an epoxy resin core that ensures good mechanical performances and excellent insulation level. The external coating consists of liquid silicone rubber co-moulded on the core that guarantees excellent resistance to degradation caused by atmospheric agents (sandstorms, UV radiations, saline environment, industrial pollution...).

The insulator is provided with an aluminium flange for fixing to no°6 M10 studs of the transformer carpentry.

The electric field inside the insulator is controlled by a metal shield. This shield must normally be connected to earth by means of the set included in the supply of the insulator, but it can be used to pick up a voltage presence signal, using a special kit supplied separately only on request.

Every bushing is supplied with:

- ✓ Nickel-plated brass nuts and washers for air side connection (M20)
- ✓ Nuts and washers in brass for the oil side connection (M20)
- ✓ Cork rubber seal
- ✓ Screen grounding set
- ✓ Nickel-plated brass cap, prepared for anchoring spark-gap horns
- ✓ Nuts and washers in stainless steel for fixing to the transformer studs (M10)

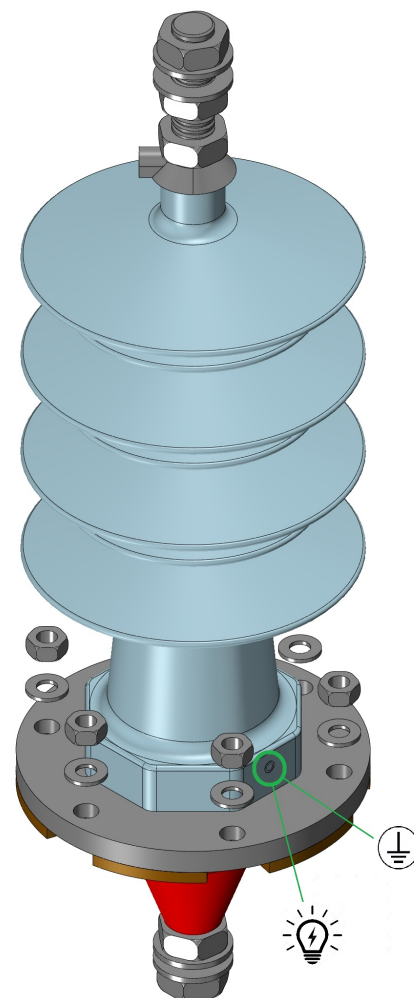
**REFERENCE STANDARDS** EN 50180, IEC 60815, IEC 60137

## ROUTINE TESTS

- Visual and dimensional check
- Glass transition temperature
- Dry power frequency withstand voltage test
- Partial discharges

## TESTS ON DEMAND

- Dry lightning impulse withstand voltage test
- Bending stress test
- Temperature rise test



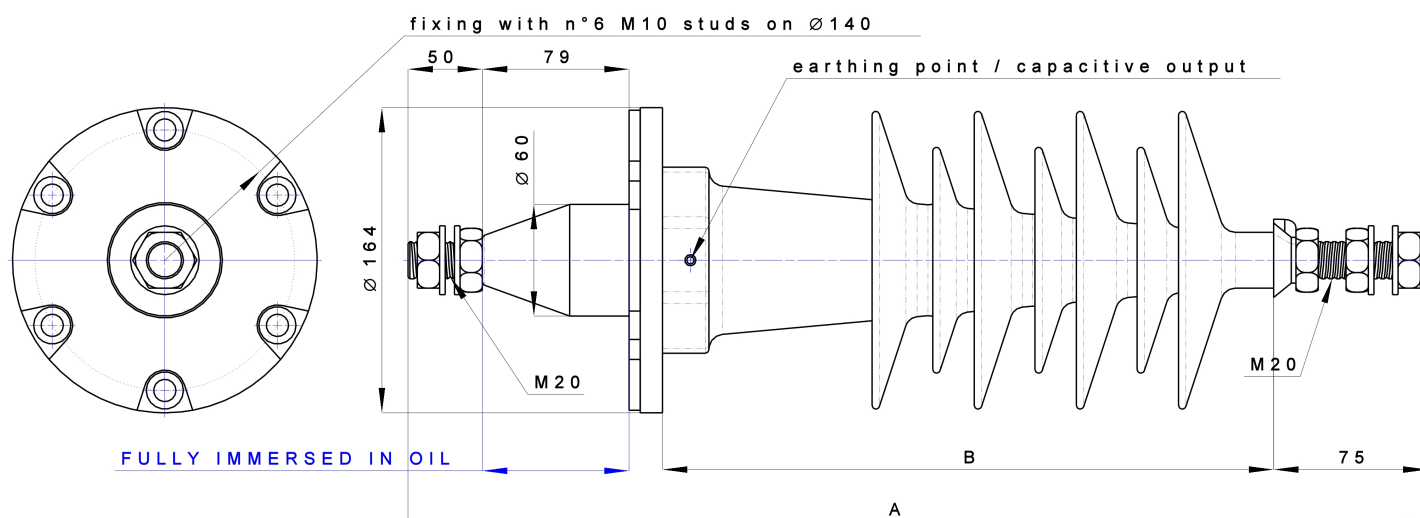
## MAINTENANCE FREE !

- ✓ good impact and shock resistance
- ✓ easy and quick assembly
- ✓ 100% guaranteed partial discharges
- ✓ **NO OIL IN THE BUSHING BODY** = reduced possibility of loss and consequent fire
- ✓ low need of periodic cleaning

EN 50180 type	Creepage distance (mm)	Drawing	Code	Max. operating voltage	Lightning impulse voltage withstand	Power frequency voltage withstand	Nominal current
12-630/P4	710	95334	95130	12kV	75kV	30kV	630A
24-630/P2	710	95334	95334	24kV	125kV	55kV	
24-630/VI	920	95333	95333				
24-630/P4	1175	95332	95332	36kV	170kV	77kV	
36-630/VI	920	95333	95431				
36-630/P2	1175	95332	95432				
36-630/P4	1320	95434	95434				

# TBS- 630A

EN 50180 transformer bushing



EN 50180 type	Creepage distance (mm)	Arching distance (mm)	Drawing	Code	Max. operating voltage	A	B	N° fins	Weight (kg)
12-630/P4	710	305	95334	95130	12kV	517	295	5	4.6
24-630/P2	710	305	95334	95334	24kV	517	295	5	4.6
24-630/VI	920	345	95333	95333		559	337	7	4.9
24-630/P4	1175	410	95332	95332		614	392	9	5.3
36-630/VI	920	345	95333	95431	36kV	559	337	7	4.9
36-630/P2	1175	410	95332	95432		614	392	9	5.3
36-630/P4	1320	500	95434	95434		734	512	9	6.5

## ASSEMBLY INSTRUCTIONS

- 1) Drill the transformer box with a min. hole.  $\varnothing 90$ , as required by EN 50180
- 2) Weld to the transformer box n°6 M10 studs at 60° on  $\varnothing 140$  diameter - as foreseen by EN 50180
- 3) Eliminate any defect on the surface on which the seal must seal
- 4) Place the cork rubber seal
- 5) Position the insulator fixed to the flange, inserting the resin part into the  $\varnothing 90$  hole and inserting the n°6 studs into the flange holes
- 6) If you DO NOT want to use the capacitive voltage presence signal, connect the shield output to one of the studs using the earthing cable supplied with the isolator
- 7) Tighten the flange on the studs using the washers and nuts provided (recommended tightening torque of 10- 15Nm)
- 8) Connect the conductor to the air termination
- 9) Connect the conductor to the oil termination

CT126 rev.0 del 01/06/2018

# IPAN

indoor bushing

## FEATURES

Red epoxy resin bushing for indoor applications with OT58 brass fittings.

This insulator comes with four brass nuts and washers to latch it on the bus bar. It has an internal screen to control the electric field.

It is used to link two Medium Voltage air insulated ends in an indoor environment far from any atmospheric agent.

Operating temperature from -25°C to +100°C.

## STANDARDS

IEC 60137

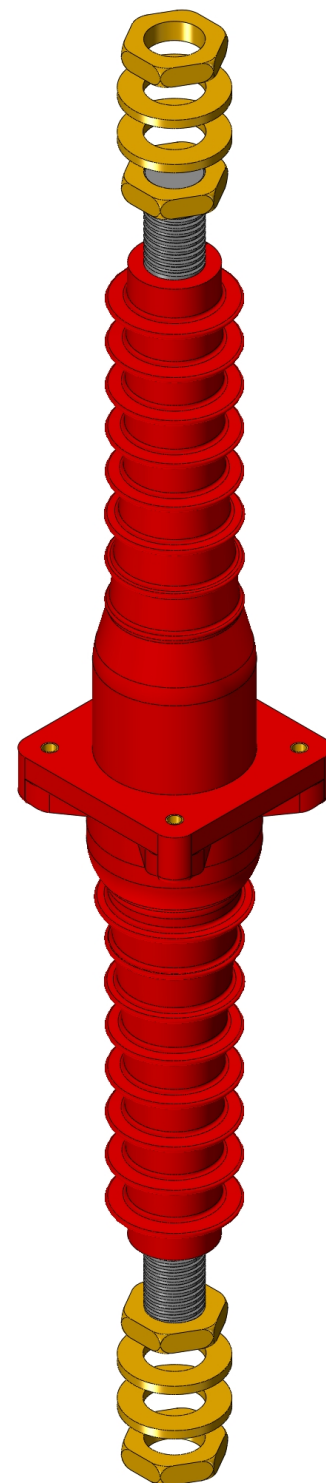
## ROUTINE TESTS

- Visual and dimensional check
- Glass transition temperature
- Dry power frequency withstand
- Partial discharges

## TESTS ON DEMAND

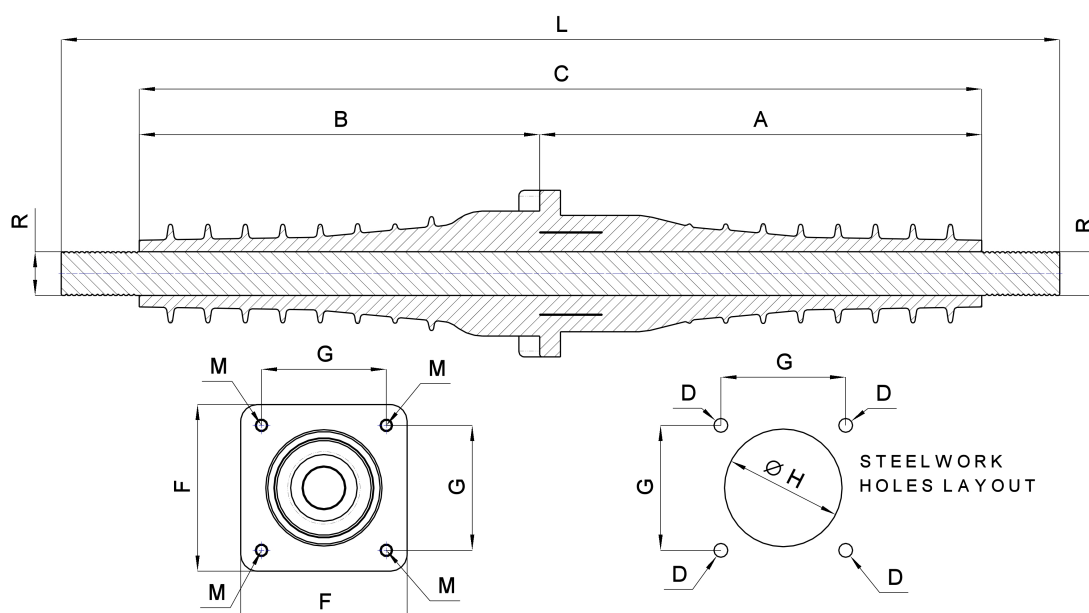
- Dry lightning impulse voltage
- Bending stress
- High temperature test

Name	Drawing	Max. operating voltage	Lighting impulse voltage withstand	Power frequency voltage withstand	Rated current
IPAN 10/250	81010	12 kV	75 kV	30 kV	250 A
IPAN 10/400	81011				400 A
IPAN 10/630	81012				630 A
IPAN 10/800	81013				800 A
IPAN 10/1000	81014				1000 A
IPAN 10/1500	81015				1500 A
IPAN 10/2000	81016				2000 A
IPAN 15/250	82010	17.5 kV	95 kV	42 kV	250 A
IPAN 15/400	82011				400 A
IPAN 15/630	82012				630 A
IPAN 15/800	82013				800 A
IPAN 15/1000	82014				1000 A
IPAN 15/1500	82015				1500 A
IPAN 15/2000	82016				2000 A
IPAN 20/250	83010	24 kV	125 kV	55 kV	250 A
IPAN 20/400	83011				400 A
IPAN 20/630	83012				630 A
IPAN 20/800	83013				800 A
IPAN 20/1000	83014				1000 A
IPAN 20/1500	83015				1500 A
IPAN 20/2000	83016				2000 A
IPAN 30/250	84010	36 kV	170 kV	77 kV	250 A
IPAN 30/400	84011				400 A
IPAN 30/630	84012				630 A
IPAN 30/800	84013				800 A
IPAN 30/1000	84014				1000 A
IPAN 30/1500	84015				1500 A
IPAN 30/2000	84016				2000 A



# IPAN

indoor bushing



Denomin.	Drawing	A	B	C	D	F	G	H	L	M	R - thread			Creepage Distance		Weight (kg)
											Diameter	Pitch	Length	Internal	External	
IPAN 10/250	81010	140	140	280	8.5	106	75	87	380	M8x20	12	1.5	45			2.3
IPAN 10/400	81011	140	140	280	8.5	106	75	87	380	M8x20	16	1.5	45			2.5
IPAN 10/630	81012	140	140	280	8.5	106	75	87	380	M8x20	20	1.5	45			2.8
IPAN 10/800	81013	175	175	350	8.5	134	110	126	470	M8x20	24	2	55			6
IPAN 10/1000	81014	175	175	350	8.5	134	110	126	470	M8x20	30	2	55			7
IPAN 10/1500	81015	175	175	350	8.5	134	110	126	470	M8x20	36	2	55			8.2
IPAN 10/2000	81016	175	175	350	8.5	134	110	126	470	M8x20	42	3	55			9
IPAN 15/250	82010	205	205	410	8.5	106	75	87	510	M8x20	12	1.5	45			3.1
IPAN 15/400	82011	205	205	410	8.5	106	75	87	510	M8x20	16	1.5	45			3.4
IPAN 15/630	82012	205	205	410	8.5	106	75	87	510	M8x20	20	1.5	45			3.8
IPAN 15/800	82013	215	215	430	8.5	134	110	126	550	M8x20	24	2	55			6.8
IPAN 15/1000	82014	215	215	430	8.5	134	110	126	550	M8x20	30	2	55			8
IPAN 15/1500	82015	215	215	430	8.5	134	110	126	550	M8x20	36	2	55			9.5
IPAN 15/2000	82016	215	215	430	8.5	134	110	126	550	M8x20	42	3	55			10.4
IPAN 20/250	83010	260	260	520	8.5	106	75	87	620	M8x20	12	1.5	45			3.5
IPAN 20/400	83011	260	260	520	8.5	106	75	87	620	M8x20	16	1.5	45			3.8
IPAN 20/630	83012	260	260	520	8.5	106	75	87	620	M8x20	20	1.5	45			4.5
IPAN 20/800	83013	260	260	520	8.5	134	110	126	670	M8x20	24	2	70			7.5
IPAN 20/1000	83014	260	260	520	8.5	134	110	126	670	M8x20	30	2	70			9
IPAN 20/1500	83015	260	260	520	8.5	134	110	126	670	M8x20	36	2	70			10.9
IPAN 20/2000	83016	260	260	520	8.5	134	110	126	670	M8x20	42	3	70			12
IPAN 30/250	84010	405	405	810	10.5	160	120	118	940	M10x20	12	1.5	60			9.8
IPAN 30/400	84011	405	405	810	10.5	160	120	118	940	M10x20	16	1.5	60			10.4
IPAN 30/630	84012	405	405	810	10.5	160	120	118	940	M10x20	20	1.5	60			11.2
IPAN 30/800	84013	405	405	810	10.5	160	120	118	960	M10x20	24	2	70			12.3
IPAN 30/1000	84014	405	405	810	10.5	160	120	118	960	M10x20	30	2	70			14.1
IPAN 30/1500	84015	405	405	810	10.5	160	120	118	960	M10x20	36	2	70			16.2
IPAN 30/2000	84016	405	405	810	10.5	160	120	118	960	M10x20	42	3	70			17.9

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