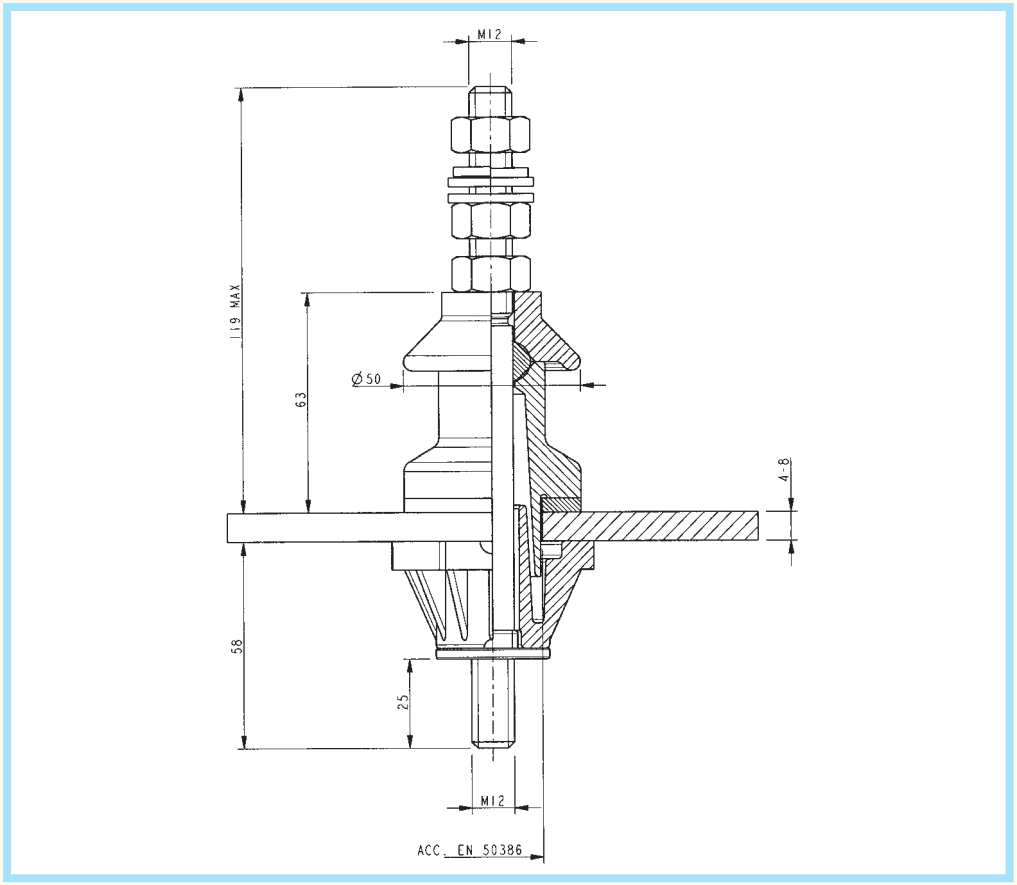
POLYMERIC MATERIAL INSULATOR TYPE
1kV 250A

PICTURE 1

Patented

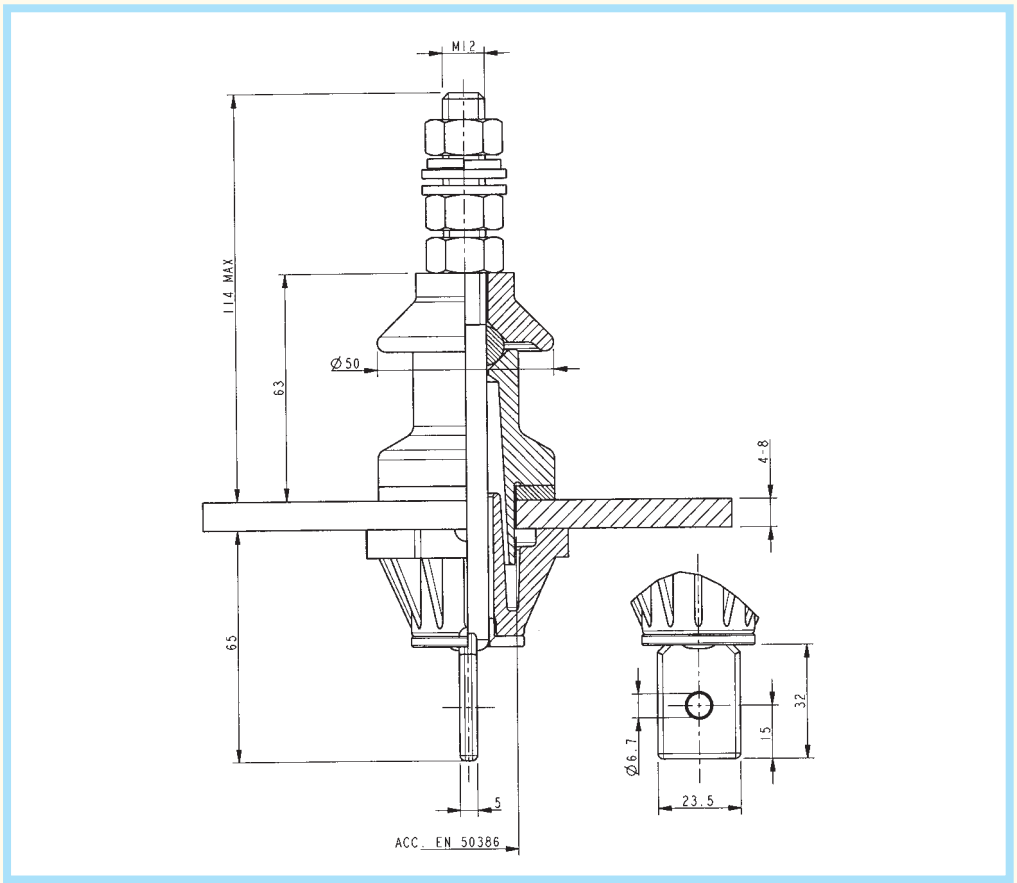
BOLTED TYPE - code 110102PL03

I - 7720

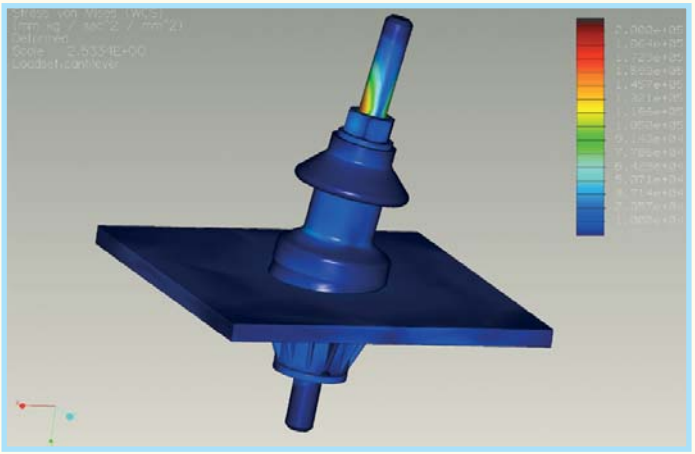


AP TYPE - code 110102PL04

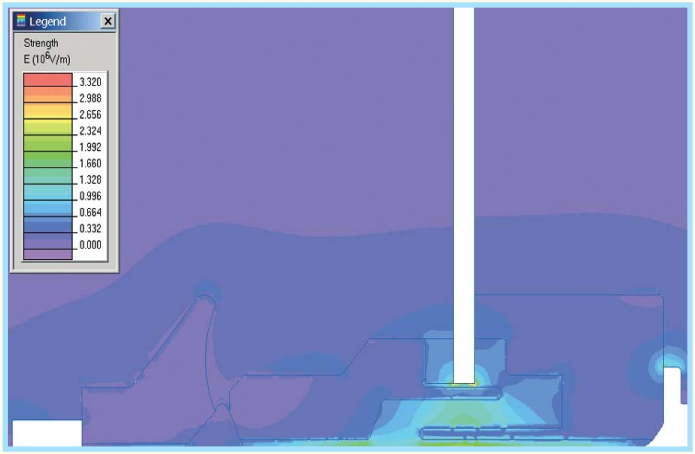
I - 7719



For more than 40 years Comem Spa has had an important role in the survey of the manufacturers of bushing insulators applied to oil insulated transformers.
During the eighties Comem presented, with great success, the first types of insulators made of thermosetting resin for medium voltage uses. They were bushing insulators with plug connection, our PPS and PPQ, which at the present are mounted on distribution transformers.
From 2000 on Comem Research Dept. projected and developed a thermoplastic insulating material which is a valid and convenient alternative to porcelain even in low voltage insulators. This is possible thanks to its physical and electrical features.
We carried out some analyses on the components by using the most modern calculation software in order to confirm our best technical choices about materials and insulating part profile. Picture 2, see here below, shows a simulation of Cantilever test load 1000 N, as provided by International Standard IEC 60137; while picture 3 shows the form of the electrical field produced by 10 kV voltage applied to the bushing insulator.

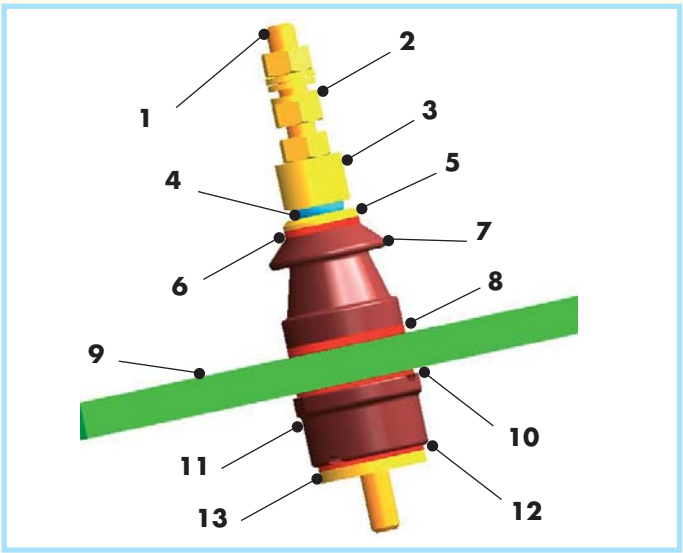


PICTURE 2

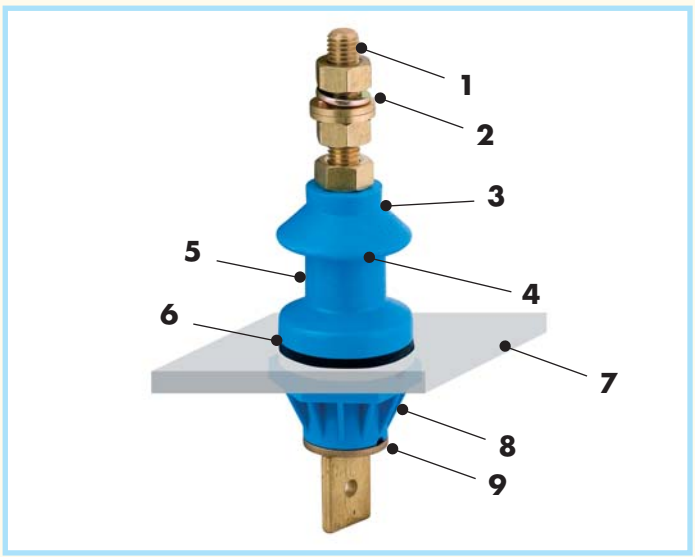


PICTURE 3

List of components:



PICTURE 4



PICTURE 5

PORCELAIN BUSHING INSULATOR		POLYMERIC MATERIAL BUSHING INSULATOR	
1.	Bolt	1.	Bolt
2.	Nuts and washers	2.	Nuts and washers
3.	Upper washer	3.	Cap of polymeric material
4.	J ring	4.	J ring
5.	Washer	5.	Upper body of polymeric material
6.	Upper gasket	6.	Gasket on transformer tank
7.	Upper porcelain	7.	Transformer tank
8.	Gasket on transformer tank	8.	Lower body of polymeric material
9.	Transformer tank	9.	Lower washer
10.	Plane gasket		
11.	Lower porcelain		
12.	Lower gasket		
13.	Lower washer		

The new polymeric material bushing insulator type 1kV 250A has got many advantages in comparison to the porcelain bushing insulator:

- the polymeric material bushing insulator withstands bigger mechanical shocks in comparison to the porcelain bushing insulator does; therefore there are no limitations and problems of handling and storage any longer;
- the polymeric material bushing insulator is very compact and it complies with much narrower dimensional tolerances in comparison to the porcelain bushing insulator does. In this way the project of the transformer will be even more precise;
- the polymeric material insulator has got a lower number of components to be assembled (12 instead of 16). The assembly time will be surely lower and consequently it will determinate a reduction in costs;
- a lower number of components means also a lower cost in production and consequently a lower selling price;
- the insulator part can be coloured in white or blue instead of brown in order to distinguish the neutral wire in the phases.

DISTINCTIVE ELECTRICAL DATA:
■ nominal current: 250 A;
■ nominal voltage: 1 kV;
■ dry and wet power frequency withstand voltage test: 10 kV;
■ dry impulse withstand voltage test: 20 kV;
■ frequency: 15 Hz – 60 Hz;
■ drawing: I-7720 and I-7719
■ minimum creepage distance: 79 mm;
■ arcing distance: 61 mm;
■ lee protected line: 10 mm;
■ materials chosen in order to grant the best performances from –40 °C to 120 °C;
■ relevant standards: we followed EN 50386 and IEC 60137.

Before its marketing, the polymeric bushing has been subjected to several tests in order to foresee and test any possible usage in the time.

1. **Usage test for 1 year.** (Test report 299) The polymeric bushings have been installed on a transformer tank filled with oil kept to 80°C and located outdoor for 1 year. We energized some bushings with an effective voltage of 1,1 kV, and we installed some others on a different structure in order to distinguish the thermal and electrical effects from the atmospheric ones. Once per month we made a check by applying a voltage of 10 kV for 1 minute and then we applied a voltage of 1,1 kV on all the bushing insulators subjected to the test in order to measure the partial discharges. Every two months we made visual checks in order to understand if there were some structural changes during the test.

2. **Dielectric test.** (Test report 4557/B) Before we begun with test 1we carried out the following dielectric tests in University of Padova:
- power frequency withstand voltage test (10 kV),
- impulse withstand voltage dry test 1.2/50 (20kV).

3. **Thermal stresses.** (Test report 296) Before and after test 1, the used samples have been subjected to 3 thermal cycles of 48 hours at 120°C and of 48 hours at –40 °C

4. **Cantilever.** (Test report 296) We followed the procedure recommended by IEC 60137 in order to test the samples used in test 3 by applying 1000N load as bending test.

5. **Radiative accelerated ageing in Weather Ometer .** (Test report 175419) Some samples have been subjected to accelerated ageing test with 1 kV power in accordance to relevant standard UNI ISO 4892: 1985. The test has been carried out for 500 hours in Istituto Giordano.

6. **Dielectric tests on bushing insulator which passed ageing test.** (Test report no 4686). The samples which stood ageing test in Istituto Giordano passed the power frequency withstand voltage test (10 kV) and the impulse withstand voltage dry test 1.2/50 (20kV).