

SILICA GEL AIR BREATHERS FOR OIL FILLED TRANSFORMERS

General specifications

Humidity and impurities reduce the dielectric rigidity of the transformer insulating oil and contribute towards the forming process of smudges thus impairing the correct operation of the transformer itself.

The intake air of transformers should therefore be filtered and dried that is dehumidified by means of an equipment specially designed for the purpose and called Silica Gel Air Breathers.

Characteristics of Silica Gel

The above mentioned chemical agent for this equipment is practically chemically pure (99,70% SiO₂) silica gel.

The quantity of water vapour adsorbed by the above gel rests on various factors among which the most important one are: ambient air temperature and the relative humidity of the former. At 100% relative humidity at the temperature of 25°C (77°F) the gel adsorbs a water vapour quantity up to 40% of its own weight, and

above these parameters the silica gel possesses no further adsorption possibilities. The saturation thus reached is evidenced by the colour change taking place in the gel during the adsorption process. From the original blue when the gel is dry, it turns pink when it is saturated.

When saturated silica gel may be reactivated by submitting it to a drying at 150-200°C until blue colour is reached.

Description of the Air Breather

This equipment consists of a hollow, medium thick plate transparent cylinder which contains the silica gel, of a stainless steel housing, flanged at its top and bottom ends with anticorrosion blank flanges provided with appropriate, threaded openings and connected among them by means of screw bolts. The bottom flange is fitted with a removable tank which is filled, when ready for operation, with transformer oil up to about half the height of the oil level check glass. In this tank there is a hollow aluminium cylinder the bottom end of which in the oil of the tank is immersed, whilst at its top end protrudes into the gel cylinder and is provided with a horizontal ring of holes. The compound oil tank and hollow aluminium cylinder constitute a siphon, that is a hydraulic trap which prevents the getting into contact of the gel with the ambient air, as long as the transformer operates at constant temperature, whilst, when suction

takes place, air is admitted under filtering action into the transformer owing to the pressure difference prevailing under such circumstances.

Under inverse operating conditions, the excess air is exhausted by the same way bubbling through the oil. The intake air opening is located at the bottom of the equipment, thus avoiding all possibilities of rain water entering it.

There are several sizes of this equipment, and in those containing a gel quantity ranging from 2 to 10 Kg, the air intake opening is moreover fitted with a filter cartridge which prevents the entering into the equipment of whatsoever material. The threaded bore in the top flange of the equipment serves for the connection with the conservator oil suction pipe.

All external parts of the equipment are stove enamel finished, except the stainless steel part of the housing.

Construction and operation

The air breathers consists of a hollow transparent cylinder which contains the silicagel, of a steel housing flanged and its top and bottom ends with light metal blank flanges. The bottom flange is fitted with a removable tank which is filled, when ready for operation, with transformer oil up to half the height of the oil level windows. In this tank there is a hollow cylinder the bottom end of which in the oil of the tank is immersed. The compound constitute an oil seal which prevent contact between

the atmospheric air and the gel charge when no breaking is taking place, whilst, when suction takes place, air is admitted under filtering action into the transformer owing to the pressure difference prevailing under such circumstances. The saturation of silicagel is evidenced by the colour change taking place in the gel during the adsorption process. From the original blue when the gel is dry, it turns pink when it is saturated.
