

## The infrared verification of the function of TRAFOSEAL II

The primary aim of the sealing of a transformer via the TRAFOSEAL system is an active suppression of the external contamination. Continuous ingress of the oxygen (O<sub>2</sub>) and moisture in the oil, together with the transformer's relatively high temperature, inevitably increases the oxidation aging of its insulants and decreases its reliability and life-expectation.

The external contamination of a transformer with free oil level in the conservator generally governs three phenomenons: diffusion of gases and moisture in the conservator oil inventory, mixing of contaminated oil and the oil from the main tank, and the transportation of the oil between the conservator and the main tank.

The intensity of these phenomenons dominantly depends on the temperature difference between the transformer oil inventory and surroundings and oil inventory dilatation.

If the temperature of the oil in a conservator is near the oil's temperature in the main tank, the intensity of all these undesired phenomena is at maximum and vice versa.

The primary verification of the TRAFOSEAL II function offers, therefore, the comparison of the surface temperatures of two furnace transformers via an infrared camera.

The first one (KM108) with the TRAFOSEAL II, and the second one (KM 106) without this sealing system serves as a reference system. Both transformers are the same type, and working under the same load.

### Weitere Informationen

### Referenzaufnahme

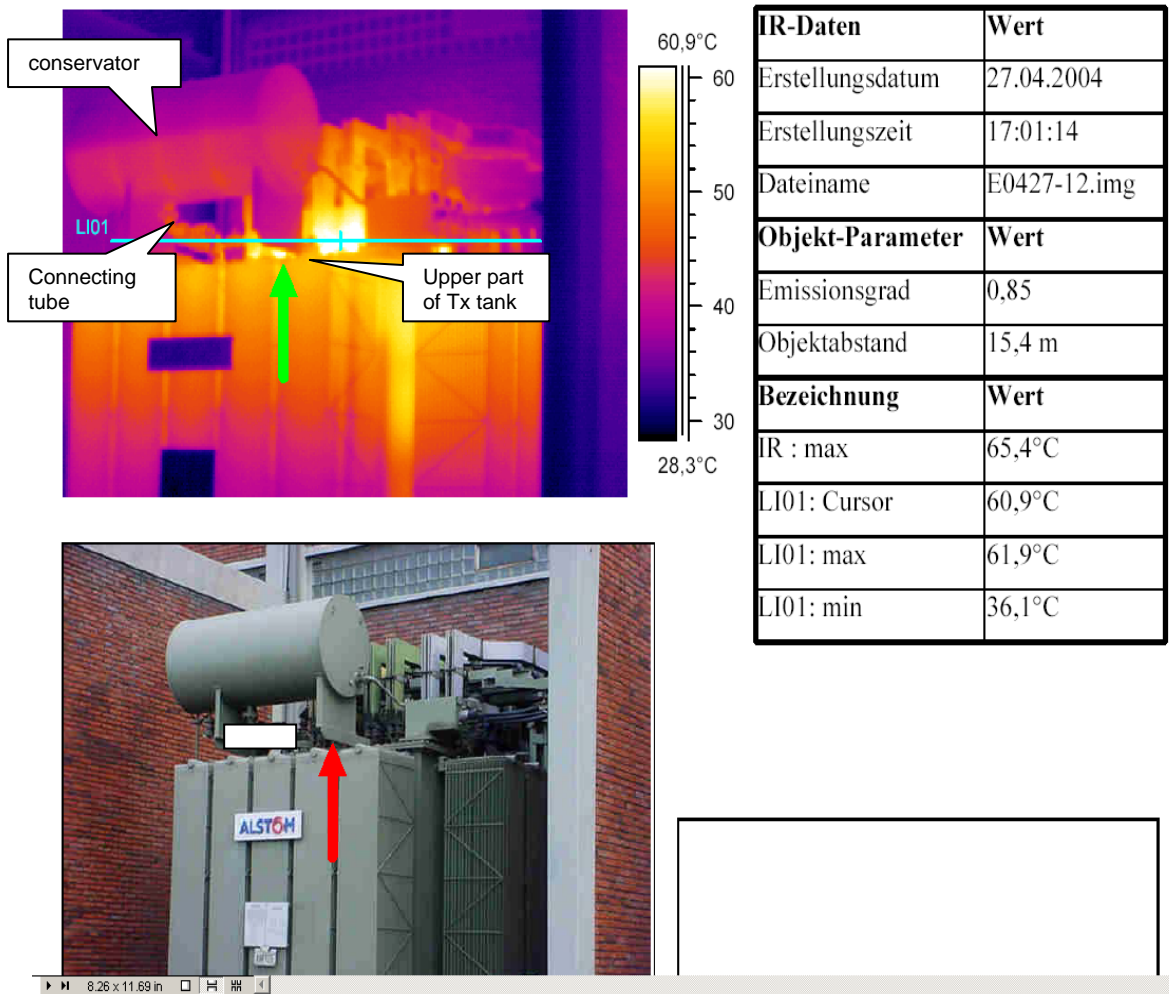


Fig. 1 The distribution of surface temperatures of the reference transformer KM 106.

Fig. 1 shows that the conservator of the reference transformer (KM106) is continuously „flushed“ by the hot oil from the upper part of the main tank. The infrared picture indicates that the difference between the surface temperature of conservator and the upper part of the main tank is minimal.

The conservator serves here as an auxiliary cooler and a „mixer“ and the saturation of the oil by the air gases is maximal.

The two problems exist here :

- ⇒ the intensity of the O<sub>2</sub> contamination should to be radically suppressed
- ⇒ the free dilatation of the transformer oil inventory has to be maintained.

The TRAFOSEAL II system then effectively solves both problems.

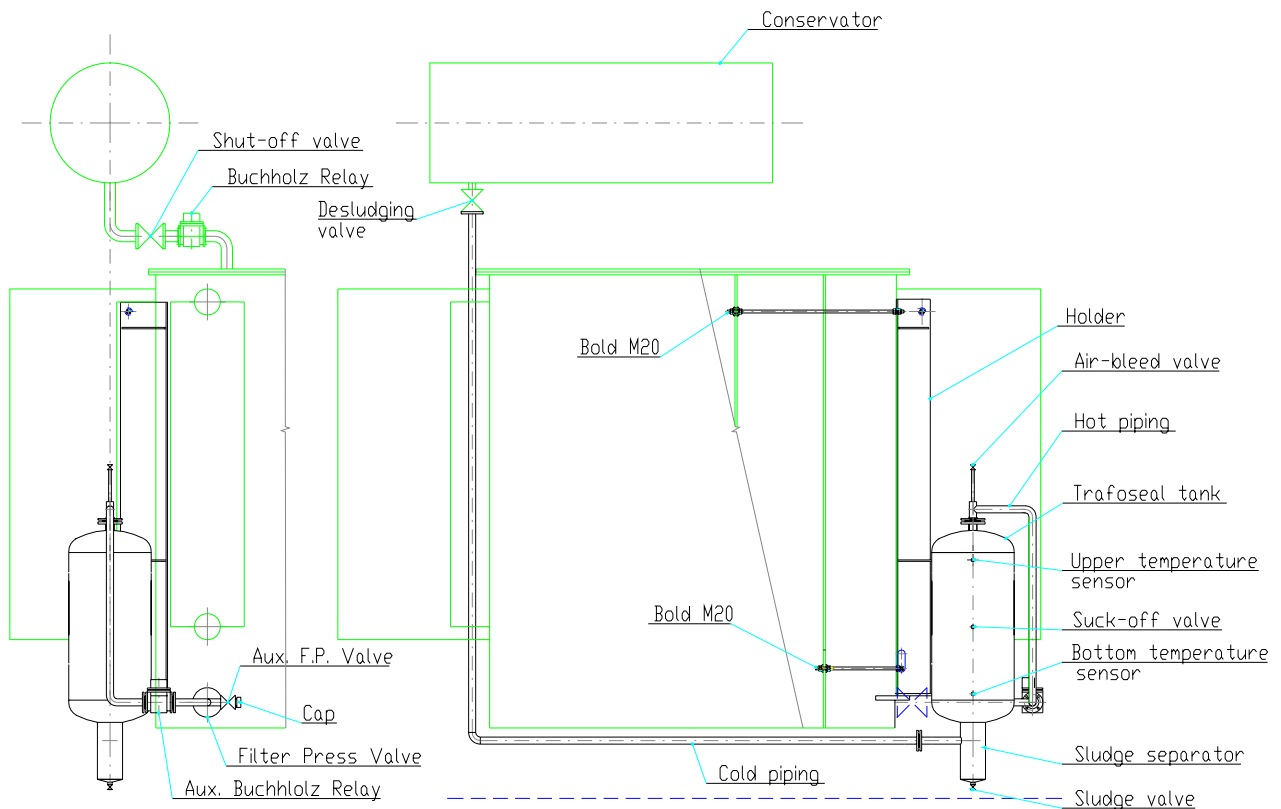


Fig. 2 The lay-out of the TRAFOSEAL II – transformer KM108

In contrast to standard sealing methods (e.g., bag-in tank, N<sub>2</sub>-cushion, etc.) the TRAFOSEAL installation takes ca 2 days, under normal operation conditions, no shut-down is necessary.

The so-called cold piping connects the bottom part of the TRAFOSEAL tank to the conservator and its upper part, the so-called hot piping to the main tank. That's all.

The sealing element is here the stratification layer(s), a natural, membrane-like phenomenon, between the hot and cold oil in the TRAFOSEAL II tank. It originates spontaneously, and suppresses the free mixing the cold (potentially contaminated) oil and hot oil from the transformer.

The dilatation of the oil inventory with the temperature (load) generates only a vertical motion of the stratification layer inside of the TRAFOSEAL tank up and down.

The commissioning of the TRAFOSEAL II system is simple: desludging valve under the conservator and the filter press valve is open. And, simultaneously, the shut-off valve between the main tank and conservator is closed.

The hydraulic connection between the conservator and the main tank is now provided only by the TRAFOSEAL II.

The „sealing“ effect of TRAFOSEAL II shows the following picture in Fig. 3.

**Bereich / Gebäude**                      **Trafo KM 108**  
**Verteilung / Feld**                      **Standort rechts vom Trafo**  
**Bauteil / Maschine**  
**Weitere Informationen**

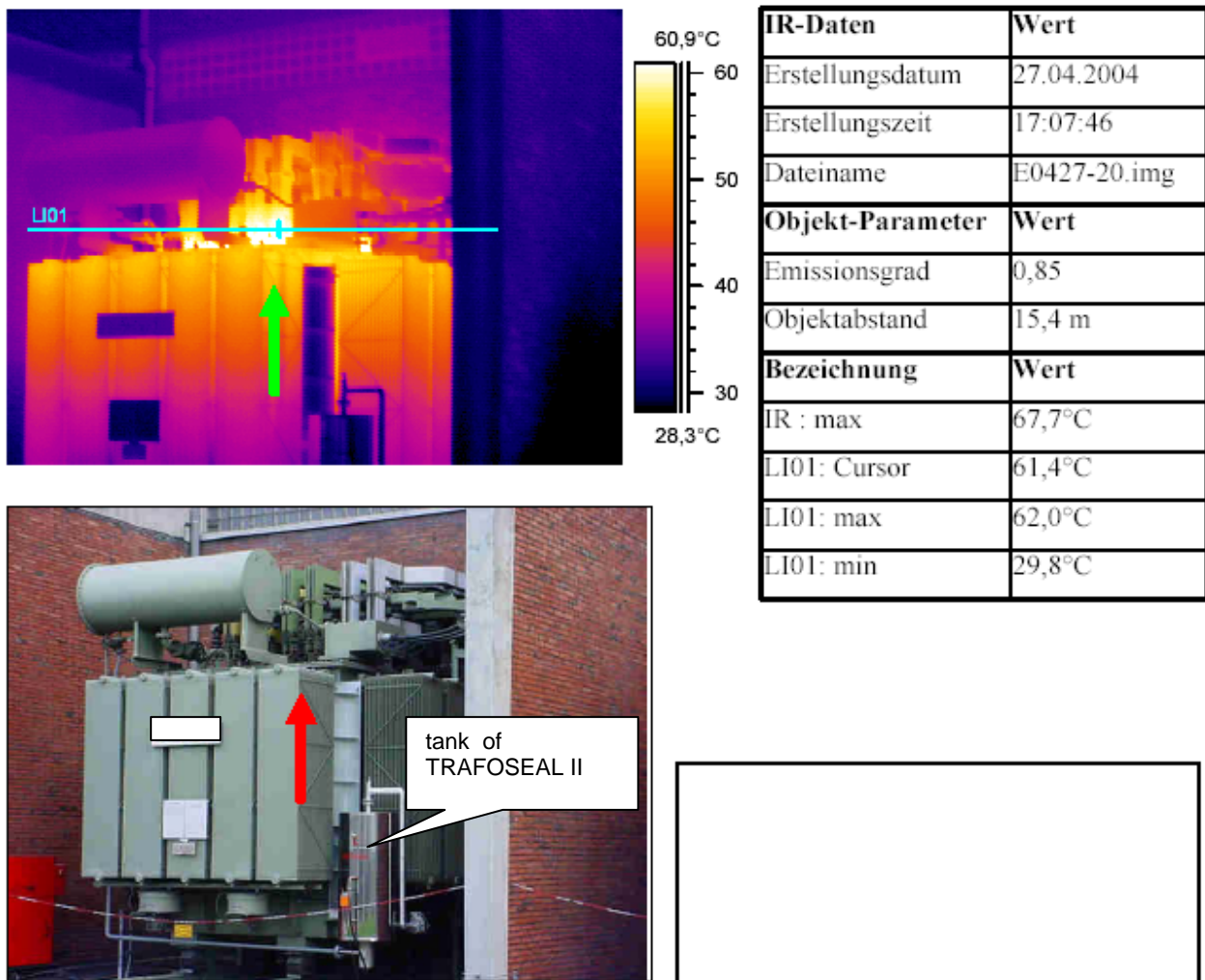


Fig. 3 The distribution of surface temperatures of the KM108 transformer sealed by the TRAFOSEAL II

The Fig. 3 shows that the surface temperature of the conservator remains low and corresponds only to the heating by the warm air from the air coolers situated under the conservator.

**Conclusion: The transport of hot oil into the conservator, and the transport of cold, contaminated oil into the main tank vanished.  
The ingress of air gases into the transformer vanished as well.**

For more detailed technical information, See please [www.ars-altmann.com](http://www.ars-altmann.com) / Product Range / TRAFOSEAL, the legal issues are covered by US Patent 7,122,075 B2.