

---

### C10.2.1.

Acetylene black or other conductive carbon blacks in HV cable compounds. A historical fact or a technological requirement?

PROBST N., GRIVEI E., VAN BELLINGEN C., Erachem Comilog SA Brussels, Belgium

---

Acetylene black is used historically in semicon compounds for cable applications and has to a large extent maintained this position in the High Voltage field. In other, non cable conductive composites acetylene black has been replaced by conductive carbon blacks showing usually a better conductivity at lower loading. Acetylene black, commercially produced since the early thirties, was the first high structure carbon black on the market. comparable high structure furnace blacks appear only in the late sixties. Acetylene black has been immediately considered as conductive filler when the first polymer based shielding materials have been developed in the early sixties. Acetylene black was the only conductive filler fulfilling the major requirements: conductivity at acceptable level, very good dispersion, very low chemical and metal contamination.

The present paper will consider conductive carbon blacks as alternative to acetylene black. The comparison will cover all major aspects involved in the selection of the adequate conductive filler for semicon and more specifically for High Voltage cables.

The paper will be divided into 4 parts:

1. Fundamental investigation of the morphological and chemical difference using besides most modern techniques like Tunneling Microscopy (STM), and SIMS time of flight, all known classical methods to investigate carbon structure. .
2. Quantitative and qualitative impurity analysis, covering undispersible matters, adsorbed species and elemental analysis
3. Compounding and processing characteristics
4. Compound analysis covering electrical and di-electrical characteristics, carbon black dispersion and surface smoothness.

Consequently we will discuss the relative importance of the differences observed between the acetylene black and low surface area conductive blacks.

The low surface area, high structure carbon blacks appear to be outstanding candidates for HV semicon compounds. Their production process opens, due to its flexibility, new possibilities for developments.