OFFERS

Our services

- Screening of corrosiveness
  Testing with only about 1 kg of formulation
- Quantification of corrosive and/or abrasive behavior
  Platelet test with about 10-40 kg
- Testing materials (e.g. tool steels) towards corrosion and/or abrasion resistance
- Investigation of wear mechanism
- Formulation development, minimizing corrosion
  e.g. Flame retarded polymers
- Accompanying the development phase and transfer to industrial processing

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Fraunhofer LBF's plastics research division, which evolved out of the German Plastics Institute (Deutsches Kunststoff-Institut DKI), supports its customers along the entire added value chain. We specialize in the management of complete development processes and advise our customers at all stages of development. As an established competence center for additivation-, formulation-, and hybrid issues, we offer comprehensive know-how in the fields of polymer analysis and characterization of properties changes during processing and use, as well as the development of time-resolved processes.
AGGRESSIVE PLASTIC MELTS

Some polymer formulations prove to be extremely corrosive towards the steel materials of, for example, extruder housings or screws. Typical examples are halogen-free flame-retardant formulations containing aluminium diethyl phosphinate. In the melt such additives can react directly with the steel materials or they form aggressive chemicals, such as inorganic acids through thermal decomposition. Certain additives act as corrosion inhibitors. However, they can adversely affect the target properties. Thus, to develop an effective compound, a lot of formulations have to be prepared in the end through melt compounding and tested with regard to the target properties and corrosiveness.

Analogously, the problem arises in the material selection for the aggregate to be used for processing a given corrosive formulation. Here, it will be necessary to test a larger number of different alloys. Furthermore abrasive fillers can cause wear on processing machines, especially in interaction with corrosive components of the formulation.

CORROSION AND WEAR TEST

For wear testing, two methods are available at Fraunhofer LBF. For the established DKI platelet apparatus, the plastic melt is extruded through a gap formed by two oppositely located platelets consisting of a tool steel. The extent of the wear caused by the melt is evaluated from the weight loss of the platelets and the microscopic wear pattern. Typically 10 – 40 kg of granulate is required for each formulation and platelet pair. At Fraunhofer LBF, a screening method was devised primarily for development of polymer compounds and additives, that makes it possible, to assess rapidly the corrosiveness of a formulation requiring only low amounts (approx. 1 kg).

The patented method is essentially based on an electrochemical measurement in the plastic melt. To that end, two electrodes are situated on either side of a melt channel, one of which constitutes the test electrode from tool steel, the other – the counter electrode e.g. from precious metal.

The short-circuit current emerging between test and counter electrode is a measure for the corrosiveness of the melt.

AREAS OF APPLICATION

• Testing of commercial compounds, e.g. quality checking
• Screening accompanying development of new additives and formulations
• Suitability testing of steel grades