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EGOLF RECOMMENDATION 001-2016

Subject of Recommendation	**Non-separable multilayer products with aluminium or other metallic foils – Procedure of delamination**
Related test standard	EN ISO 1716:2010 Reaction to fire tests for products – Determination of the heat of combustion
Date of issue	
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Problem

When products to be tested are received by laboratories as "non-separable" multilayer products and one of those layers is aluminium (or other metallic) foil, e.g. aluminium foil plus an adhesive to be attached to other substrates or aluminium based vapour barrier foils, the requirements of EN ISO 1716 cannot be followed.

According to EN ISO 1716 clause 7.1, each layer shall be tested independently (i.e. in this case the non-metallic layer(s) and the metallic layer). Also, according to EN 1716 clause 9.4.1, "Any metallic component shall not be tested and the gross heat combustion used to calculate total PCS shall be zero".

The problem is that the PCS-value of the non-metallic layer(s) alone cannot be determined without separating the layers or testing the total composite, which is forbidden on safety grounds.

Recommendation

The procedure described below shall be followed when preparing test specimens from materials comprising non-separable multilayer products (or products in which the layers are not available separately from the manufacturer) in which one layer comprises aluminium foil (or other metallic foils) such that the non-aluminium layer (non-metallic layer) may be tested.

Procedure:

Note: This procedure is mainly written for aluminium based product, but can be used for any other metallic component that is required to be removed before testing. Any aluminium component **must not be tested** and set in the bomb calorimeter, due to risk of serious injuries to the operator, potential damage to the bomb and crucible due to overheating and/or hazard from overpressure.

"The procedure is not suitable for organic layers that may be dissolved by Hydrochloric Acid, e.g. paper layers, certain glue layers etc.

Separation of aluminium (metallic) layer from an organic layer (polyethylene, polyester …)

The usual safety precautions must be observed by the operator during use of this procedure, such as wearing gloves, glasses and working under a fume hood.

- Cut one or several piece(s) from the aluminium laminated foil of known dimension(s) so as to get a minimum surface of 0,1m^2.

- Dry the pieces in an oven at 105°C until constant mass is achieved. Determine the total mass of the piece(s). M_{total}

- Put the piece(s) in a glass beaker and fill it with enough concentrated hydrochloric acid so as to fully cover the piece(s).

- After complete disappearance of the aluminium (a slight manual stirring of the solution with a glass stirring rod might be found useful), abundantly rinse the organic residue(s) with de-ionised or distilled water until a neutral pH is obtained.

- Dry the residue(s) in an oven at 105 °C until constant mass is achieved. Note this mass. M_{org}
- The mass of the aluminium in the original sample is $M_{aluminium} = M_{total} - M_{org}$

- The organic material is ready to be conditioned and tested according to the EN ISO 1716.