



## **COMPLIANCE OF PLASTICS CONTAINING ADDIFLEX® WITH ASTM D-6954 STANDARD GUIDE FOR EXPOSING AND TESTING PLASTICS THAT DEGRADE BY A COMBINATION OF OXIDATION AND BIODEGRADATION**

### **Introduction**

ASTM D-6954 is a three-tiered procedure – initial abiotic degradation, biodegradation and ecotoxicity. Plastics containing Addiflex® have been tested according to this guide.

### **Tier 1**

#### **Abiotic degradation leading to fragmentation**

Plastics containing Addiflex® have been tested numerous times according to ASTM procedure D-5208, Practice for Fluorescent Ultraviolet (UV) Exposure of Photodegradable Plastics, and ASTM procedure D-5510, Practice for Heat Aging of Oxidatively Degradable Plastics. Complete fragmentation has been proven.

### **Tier 2**

#### **Biometer test for biodegradation of all fragments in environment of choice**

Biodegradation, measured by carbon dioxide evolution, has been proven using a procedure similar to ASTM D-5338. The level of biodegradation was over 60% in 180 days.

### **Tier 3**

#### **Ecotoxicity**

There are two elements to the requirements for lack of ecotoxicity. Firstly there need to be no levels of heavy metals above the accepted guidelines. In the case of Addiflex® the results were as described in the table below:

<b>Heavy metal</b>	<b>Amount found in the polymer film with 20% Addiflex® mg./kg.</b>	<b>Limits according to DIN 54900 mg./kg.</b>
Lead	<2.3	30
Chromium	<1.0	30
Nickel	<0.5	15
Zinc	20	100
Cadmium	<0.1	0.3
Copper	<2.0	22.5
Mercury	<0.23	0.3

All analysed heavy metals in the polymer film with Addiflex® were below the limits according to DIN 54900.

ASTM D-6954 also requires a plant growth test according to OECD Guideline 208. The results from the tests with plastics containing Addiflex® are summarized below:

	<b>Substrate mixture A with 25% soil with test material 10% Addiflex®</b>	<b>Substrate mixture B with 25% soil with test material 20% Addiflex®</b>	<b>Substrate mixture A with 50% soil with test material 10% Addiflex®</b>	<b>Substrate mixture B with 50% soil with test material 20% Addiflex®</b>
Germination rate of wheat, % compared to control	101.1	107.6	102.3	110.2
Biomass of wheat, % compared to control	113.3	98.2	115.9	125.6
Germination rate of mustard, % compared to control	101.1	107.6	102.3	109.1
Biomass of mustard, % compared to control	112.6	97.6	115.5	124.7

These results show that the plant growth requirements of the EN 13432 Standard have been fulfilled, in fact surpassed.

