

Testing Protocol of d₂w[®] Plastics to ASTM Standards



Symphony has a wide range of additives branded d₂w[®], which are included at the extrusion stage in all grades of Polyethylene (PE) and Polypropylene (PP) to control the fit for purpose life, as well as the degradation time.

How do Oxo-Biodegradable Plastics Degrade?

Phase 1: Oxo-degradation - is an oxidative degradation of Polyethylene (PE) and Polypropylene (PP) that causes a break down of the molecular backbone of these plastics. The molecular structure reduces significantly and then becomes water "wettable" permitting the formation of a bio-film on the surface of the plastics which allows microbial deterioration.

Phase 2: Bio-degradation - following the reduction of the molecular weight to sub 40.000 daltons the surface of material allows the microbes to consume the remaining backbone. This process continues as biodegradation leaving nothing more than CO₂, H₂O, humus and trace elements which are non toxic, nor harmful.

EcoToxicity

Symphony has demonstrated that d₂w[®] degraded residues have been tested to the EcoToxicity requirements of EN 13432, the European Standard for packaging recoverable through composting and biodegradation.

E.U. Direct Food Contact Directive 2002/72/EU

d₂w[®] additives are suitable for use in direct food applications in compliance with by EU Directive 2002/72/EU as amended and US FDA Code of Federal Regulations Chapter 21.

UK Testing Facility

Products containing our d₂w[®] additives are tested to monitor degradation through changes in the Aesthetics, Chemical and Mechanical properties of the product as described in the following ASTM Standards.

ASTM¹ Standards used by Symphony to Test Degradable Plastics

ASTM D 1238 – Is the test method that covers the measurement of the rate of extrusion of molten resins through a die of a specified length and diameter under prescribed conditions of temperature, load, and piston position in the barrel as the timed measurement is being made.

ASTM D 882 - This test method covers the determination of the comparative tensile strength and elongation properties of plastics in the form of films less than 1.00mm (0.04in) in thickness.

ASTM D 3826 - This practice covers the determination of a degradation-end point (*a brittle point*) for degradable polyethylene/polypropylene films and sheeting less than 1.0 mm (0.04 in.) thick. This practice is not intended for determination of the rate of degree of degradation of a polyethylene/polypropylene film or sheet, but rather, to assess when in the course of its degradation under some condition, a brittle point is reached.

ASTM G 53 + ASTM D 5208 - These test methods cover the principles and operating procedures for using the fluorescent ultraviolet (UV) and condensation apparatus to stimulate the deterioration caused by sunlight and water as rain or dew.

ASTM D 5576 - Using an FTIR spectrometer, the accumulation of chemical products with carbonyl groups in polyolefins is monitored

ASTM D 5510 - This method is standard practice for heat aging. This simulates the conditions in landfill and composting environments.

¹ – refer to ASTM Standards website on: <http://www.astm.org>



ISO 9001-2000



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