



Designation: D7209 – 06

Standard Guide for Waste Reduction, Resource Recovery, and Use of Recycled Polymeric Materials and Products¹

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1. Scope

1.1 This guide provides information for the development of standards (guides, practices, terminology, test methods, or specifications) relating to plastics recycling and other means of waste reductions and resource recovery.

1.2 This guide is directed to consumer, commercial, and industrial sources of thermoplastics and thermoset polymeric materials.

1.3 This guide addresses terminology, performance standards, specifications, quality assurance, separation or segregation of product by classes, identification and marking of generic classes, contaminants, fillers, designing for recycle, degradable products, reconstituted products, biobased resins, certification and percentages of recycled products, and other methods of waste reduction and resource recovery.

1.4 This guide does not address parameters or factors involving the original manufacture of virgin polymers or the fabrication of consumer products from these virgin polymers.

1.5 This guide is intended to replace Guide [D5033](#).

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

NOTE 1—There is no equivalent ISO standard. ISO/DIS 15270 is similar in scope and content.

2. Referenced Documents

2.1 *ASTM Standards*:²

[D883 Terminology Relating to Plastics](#)

[D1600 Terminology for Abbreviated Terms Relating to Plastics](#)

[D1972 Practice for Generic Marking of Plastic Products](#)

[D2665 Specification for Poly\(Vinyl Chloride\) \(PVC\) Plastic Drain, Waste, and Vent Pipe and Fittings](#)

[D5033 Guide for Development of ASTM Standards Relating to Recycling and Use of Recycled Plastics \(Withdrawn 2007\)](#)³

2.2 *Federal Standards*:⁴

[16 CFR Part 260 Guides for the Use of Environmental Marketing Claims](#)

2.3 *ISO/IEC Standards*:⁵

[ISO/DIS 15270 Guide for Recovery](#)

3. Terminology

3.1 *Definitions*:

3.1.1 *agglomerate, n*—shredded or granulated plastics material or both in the form of particles that cling together.

3.1.2 *bale, n*—plastics waste that is compacted and secured as a bundle to facilitate handling, storage, and transportation.

3.1.3 *batch, n*—quantity of material regarded as a single unit and having a unique reference.

3.1.4 *biobased resin, n*—resin in which carbon is derived from a renewable resource by means of biological processes and the environmental benefits of the biobased resin are demonstrated and this includes resins derived from plant resources (such as starch or cellulose) or those produced by microbial fermentation.

3.1.5 *biodegradable plastic, n*—degradable plastic in which the degradation results from the action of naturally occurring microorganisms such as bacteria, fungi, and algae.

3.1.6 *biodegradation, n*—degradation caused by biological activity, especially by enzymatic action leading to a significant change in the chemical structure of a material.

3.1.7 *certificate of composition disclosure, n*—certificate describing certain properties of a recycled material from an

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ The last approved version of this historical standard is referenced on www.astm.org.

⁴ Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401.

⁵ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

external source, its formulation and source, and the specific material shipment to which it applies.

3.1.7.1 *Discussion*—Examples include polymer, molecular weight, percentage of inorganic material, contamination type and level, strength, modulus, impact, and other mechanical properties; code or designation identifying the formulation and source information.

3.1.8 *chemical recycling*, *v*—processing of waste material, with significant change to the chemical structure of the material (such as cracking, gasification, and depolymerization), but excluding energy recovery or incineration.

3.1.9 *chips*, *n*—see *regrind*.

3.1.9.1 *Discussion*—Chips is a deprecated term.

3.1.10 *collection*, *n*—logistical process of moving (plastics) waste from its source to a place where it can be recovered.

3.1.11 *commingled plastics*, *n*—mixture of materials or products consisting of different types of plastics.

3.1.12 *compostable plastic*, *n*—plastic that undergoes degradation by biological processes during composting to yield carbon dioxide, water, inorganic compounds, and biomass at a rate consistent with other known, compostable materials and leaves no visually distinguishable or toxic residue.

3.1.13 *contaminant*, *n*—unwanted substance or material defined according to the intended use.

3.1.14 *converting*, *v*—shaping plastics raw material to make a usable semifinished or finished product.

3.1.15 *degradable plastic*, *n*—plastic designed to undergo a significant change in its chemical structure under specific environmental conditions resulting in a loss of some properties that may vary as measured by standard test methods appropriate to the plastic and the application in a period of time that determines its classification.

3.1.15.1 *Discussion*—Types of degradable plastics include biodegradable, hydrolytically degradable, oxidatively degradable, and photodegradable. Refer to Terminology **D883** for definitions.

3.1.16 *depolymerization*, *n*—chemical reversion of a polymer to its monomer(s) or a polymer of lower relative molecular mass.

3.1.17 *energy recovery*, *n*—use of combustible waste as a means to generate energy through direct incineration with or without other waste but with recovery of the heat.

3.1.18 *environmental aspects*, *n*—element of an organization's activities, products, or services that can interact with the environment.

3.1.19 *environmental impact*, *n*—any change to the environment, whether adverse or beneficial, wholly or partially, resulting from an organization's activities or products.

3.1.20 *feedstock (chemical) recycling*, *v*— processing of plastics material resulting in significant change to the chemical structure of the material (such as cracking, gasification, and depolymerization), excluding energy recovery or incineration.

3.1.21 *flake*, *n*—plate-like regrind.

3.1.21.1 *Discussion*—The shape of regrind depends on the shape of the product being processed and the regrind process used.

3.1.22 *fluff*, *n*—filament-like regrind.

3.1.22.1 *Discussion*—Common usage of the term fluff also includes shredder residue fractions produced in the commercial recycling of durable goods such as automobiles.

3.1.23 *heterogeneity*, *n*—degree to which a constituent or a property or both is not uniformly distributed throughout a relevant quantity of plastics material.

3.1.23.1 *Discussion*—A material may be homogeneous with respect to one constituent or property but heterogeneous with respect to another.

3.1.24 *homogenizing*, *v*—processing to improve the degree to which a constituent or property or both is uniformly distributed throughout a quantity of plastics material.

3.1.25 *hydrolytically degradable*, *adj*—degradable plastic in which the degradation results from hydrolysis.

3.1.26 *impurity*, *n*—see *contaminant*.

3.1.26.1 *Discussion*—Impurity is a deprecated term.

3.1.27 *industrial rework*, *n*—rework generated by a different company or manufacturing plant from the company or manufacturing plant producing the products to this specification and the composition is known by the industrial source of the material.

3.1.27.1 *Discussion*—The material shall not be purchased from a third party (for example, grinding, repackaging facility) unless there is a documented system in place to ensure that the material is clean, free of contamination, and is of a single source and single material compound. Postconsumer recycled material is not industrial rework and is prohibited from use in products within Specification **D2665**.

3.1.28 *landfill*, *n*—waste disposal site for the deposit of waste onto or into land under controlled or regulated conditions.

3.1.29 *lot*, *n*—definite quantity of some commodity manufactured or produced under conditions that are presumed uniform.

3.1.29.1 *Discussion*—Lot is primarily a commercial term.

3.1.30 *material recovery*, *n*—material processing operations including mechanical recycling, feedstock (chemical) recycling, and organic recycling, but excluding energy recovery.

3.1.30.1 *Discussion*—see also *recovery*.

3.1.31 *mechanical recycling*, *v*—processing of plastics waste into secondary raw material or products without significantly changing the chemical structure of the material.

3.1.31.1 *Discussion*—Plastics secondary raw material is a synonym of recycle.

3.1.32 *micronizing*, *v*—process by which plastics material is finely ground into powder.

3.1.33 *off-grade material*, *n*—polymer or plastics material of composition that is not represented to meet its manufacturer's specification.

3.1.34 *organic recycling, n*—aerobic, that is, composting, or anaerobic (biomethanization) treatment of biodegradable plastic under controlled conditions using microorganisms to produce stabilized organic residues, methane, and carbon dioxide.

3.1.35 *oxidatively degradable plastic, n*—degradable plastic in which the degradation results primarily from oxidation.

3.1.36 *photodegradable plastic, n*—degradable plastic in which the degradation results primarily from the action of natural daylight.

3.1.37 *plastics recycling, n*—process by which plastic materials or products that would otherwise become solid waste are collected, processed, and returned to use in plastic products that have fulfilled their intended purpose or can no longer be used; this includes material returned from within the distribution chain.

3.1.38 *plastics waste, n*—any plastics material or object that the holder discards, or intends to discard, or is required to discard.

3.1.39 *postconsumer material, n*—plastics material, generated by the end users of products that has fulfilled its intended purpose or can no longer be used, this includes material returned from within the distribution chain.

3.1.39.1 *Discussion*—Postconsumer material is part of the broader category of recovered material. Postconsumer plastics may come from households or commercial, industrial, and institutional facilities in their role as end users of a product. Some entities use the term “postcommercial” to identify substantial amounts of similar or identical postcommercial material from a nonhousehold source. Another term for postconsumer plastic is “postconsumer resin.”

3.1.40 *preconsumer plastics material, n*—plastics material that has been diverted from the waste stream before reaching the consumer, but excluding reutilization of material such as rework, regrind, or scrap generated in the process and capable of being reclaimed within the same process.

3.1.41 *purge material, n*—material resulting from the passing of polymer through plastics processing equipment for the purpose of cleaning the equipment or when changing from one polymer to another or from one color or grade of polymer to another.

3.1.42 *reconstituted plastic, n*—material made by chemical or thermal breakdown of plastics scrap into basic components followed by their chemical conversion into a suitable composition.

3.1.43 *recovered material, n*—(plastics) materials and by-products that have been separated, diverted, or removed from the solid waste stream, but not including those materials and by-products generated from and reused within an original manufacturing process.

3.1.43.1 *Discussion*—This definition includes postconsumer and preconsumer material only, whether or not plastic material has been commingled, reprocessed, reground, or reconstituted. Wide-spec virgin plastics as well as reworked, reprocessed, and regrind plastic and purge from the same manufacturing process are excluded.

3.1.44 *recovery, n*—processing of (plastics) waste material for the original purpose or for other purposes including energy recovery.

3.1.45 *recyclate, n*—plastic material resulting from the recycling of plastics.

3.1.45.1 *Discussion*—Plastics secondary raw material and recycled plastics are synonymous of recyclate. The term, regenerate, is also used.

3.1.46 *recycled content, n*—percentage by weight of recyclate in a material or product.

3.1.47 *recycled plastic, n*—see *recyclate*.

3.1.48 *recycling, v*—processing in a production process of (plastics) waste materials for the original purpose or for other purposes, but excluding energy recovery.)

3.1.49 *regrind, n*—shredded or granulated recovered plastics material reclaimed by shredding and granulating sprues and runners for use in houses.

3.1.49.1 *Discussion*—The term regrind is frequently used to describe plastics materials in the form of scrap generated in a plastics processing operation and used in-house.

3.1.50 *resource recovery, n*—recovery of material or energy.

3.1.51 *reuse, n*—use of a product more than once in its original form.

3.1.51.1 *Discussion*—In view of the fact that a reused product has not been discarded, reuse does not constitute a recovery option.

3.1.52 *shredding, v*—any mechanical process by which plastics waste is fragmented into irregular pieces of any dimension or shape.

3.1.52.1 *Discussion*—Shredding usually signifies the tearing or cutting of materials that cannot be crushed by fragmentation methods applicable to brittle materials, as typically carried out in a hammer mill or similar process.

3.1.53 *source reduction, n*—process that reduces the waste from any step, such as design, manufacturing, packaging, acquisition, and provision for reuse of material.

3.1.54 *virgin plastic, n*—plastic material in the form of pellets, granules, powder, floc, or liquid that has not been subjected to use or processing other than that required for its initial manufacture.

3.1.55 *waste, n*—any substance or object that the holder discards or intends or is required to discard.

3.1.56 *wide-spec resin, n*—resin that deviates from the manufacturer’s virgin resin specification in one or more properties.

3.1.56.1 *Discussion*—Also known as utility grade. Obsolete terms include “off-spec” or “off-grade virgin resin” previously defined as resin that does not meet the manufacturer’s specification.

4. Significance and Use

4.1 This guide is intended for use by committees or agencies concerned with the development of standards related to