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IS 14534 (1998): Guidelines for recycling of plastics [PCD 12: Plastics]



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Indian Standard GUIDELINES FOR RECYCLING OF PLASTICS

ICS 13.030.80;83.080

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BUREAU OF INDIAN STANDARDS MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG NEW DELHI 110002

Price Group 2

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Plastics Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

Recycling/Reprocessing of plastics waste/scrap is not new to India. The Indian processors are already collecting the plastics waste/scrap of all sorts and converting into pellets for re-use. Need for recycling/ reprocessing of plastics became more relevant with increase in the plastics consumption and also with availability of waste/scrap plastics in huge quantities. The methods of recycling and the technology used for the same at present are quite outmoded and are in need of upgradation. It has also been observed that some of the industries even recycle the plastics waste/scrap which is totally unhygienic and as such is a health hazard for persons who use items made from such plastics and even used at times for packaging of foodstuff and medicines.

Plastics waste/scrap also occurs in the commingled form and has, therefore, to be segregated before being recycled/reprocessed. It is essential to segregate the plastics waste/scrap fully and not to attempt reprocessing of commingled plastics waste/scrap without appropriate technologies. These considerations led the committee to formulate these guidelines for recycling/reprocessing of plastics.

While preparing this standard, considerable assistance has been derived from ASTM D 5033-90 'Standard guide for the development of standards relating to the proper use of recycled plastics', issued by American Society for Testing and Materials, USA.

Indian Standard GUIDELINES FOR RECYCLING OF PLASTICS

1 SCOPE

1.1 This standard prescribes guidelines for the selection, segregation and processing of plastics waste/ scrap.

1.2 This standard also prescribes guidelines to the manufacturers of plastic products with regard to the marking to be used on the finished product in order to facilitate identification of the basic raw material. It will also help in identifying whether the material used on the end product is virgin, recyclate or a blend of virgin and recyclate.

2 NORMATIVE REFERENCES

The following Indian Standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standard indicated below:

- 2828:1964 Glossary of terms used in plastics industry
- 7019:1982 Glossary of terms in plastics and flexible packaging, excluding paper (first revision)
- 14535:1998 Recycled plastics for the manufacturing of products — Designation

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 2828, IS 7019 and the following shall apply.

3.1 Commingled Plastics

A mixture of plastics waste which has not been segregated.

3.2 End Products

Product made out of virgin, recycled/reprocessed plastics. Typical suggested end products along with use of appropriate types of plastics waste/scrap as per 4 are given in Annex A.

3.3 Plastics Recycling

A process by which plastics waste is collected,

segregated, processed and returned for use.

3.4 Plastics Reprocessing

Reprocessing of plastics scrap as defined in 3.5.

3.5 Plastics Scrap

Plastics material originating from a variety of inplant/in-house operations that may consist of a single material or a blend of materials.

3.6 Post-Consumer Plastics Waste

Waste originating from the sources, like Municipal Solid Waste (MSW), catering, packaging, household, agricultural, curbside, etc.

3.7 Virgin Plastics

Plastics materials which have not been subjected to use earlier and also not blended with scrap or waste.

3.8 Re-Use

The use of product more than once in its original form.

4 TYPES OF WASTE/SCRAP

To define, maintain and monitor quality of waste/ scrap, the following practice shall be adopted for their segregation:

Post consumer waste

Type I	Post-consumer clean plastics waste			
Type II	Post-consumer plastics waste of unknown origin having visible impurities (including recycled			
	plastics waste with visible contamination).			

In-house scrap

Туре	A	In-house	plastics	scrap	of	single
Туре	в	origin. In-house	plastics	scrap-i	nix	eđ.

5 CLASSIFICATION OF RECYCLING

5.1 Plastics recycling technologies have been historically divided into four general types — primary, secondary, tertiary and quaternary.

5.1.1 *Primary Recycling* involves processing of a waste/scrap into a product with characteristics similar to those of the original product. The recycling of

1

IS 14534 : 1998

relatively uncontaminated waste plastics, that has historically taken place in the manufacturing sector, is an example of primary recycling.

5.1.2 Secondary Recycling involves processing of waste/scrap plastics into materials that have characteristics different from those of the original plastics products. Some manufacturing and postconsumer wastes currently enter secondary recycling streams that allow higher contamination levels than primary recycling.

5.1.3 Tertiary Recycling involves the production of basic chemicals and fuels from plastics waste/scrap as part of the municipal waste stream or as a segregated waste. Pyrolysis and hydrolysis are examples of these processes.

5.1.4 Quaternary Recycling retrieves the energy content of waste/scrap plastics by burning/incineration.

5.2 Only primary recycling of post-consumer materials or purchased industrial plastics scrap, and secondary and tertiary plastics recycling reduce current waste disposal volumes. Quaternary recycling falls within the term 'resource recovery'. Primary recycling of scrap from in-plant operations is so commonly practised that it is excluded from standard recycling definitions.

6 IDENTIFICATION

6.1 The manufacturers of plastics end products from either virgin or recycled plastics shall mark the symbol at the time of processing in order to help the reprocessors to identify the basic raw material. The symbols defined by Society of the Plastics Industry (SPI), USA are as follows: Alternatively, the following codification shall be used:

R 0	-	No recycle/reprocess
R 1	-	Less than 10 percent
R 2	-	11 to 20 percent
R3	-	21 to 30 percent
R4	•	31 to 40 percent
R5	-	41 to 50 percent
R 6	-	51 to 60 percent
R 7	-	61 to 70 percent
R 8	-	71 to 80 percent
R9	- '	81 to 90 percent
R10	-	over 90 percent

6.2.1 The following information shall also be printed bilingually, English/Hindi and local language wherever possible on the end-product for the benefit of users/reprocessors:

'This product (like carry bags/shopping bags, bottles, blow-moulded containers, etc) is made of (indicate materials) and is reusable/ recyclable'.

6.2.1.1 However, carry bags/containers made out of recycled plastics shall be labelled as 'Not suitable for packing/storing/carrying food products'

7 STEPS INVOLVED IN THE RECYCLING PROCESS

7.1 Selection

7.1.1 The recyclers/reprocessors have to select the waste/scrap which are suitable for recycling/ reprocessing as per the types indicated in 4.



NOTE — PET - Polyethylene terephthalate, HDPE - High density polyethylene, V - Vinyl (PVC), LDPE - Low density polyethylene, PP - Polypropylene, PS - Polystyrene and other means all Other resins and multi-materials, like ABS (Acrylonitrile butadiene styrene), PPO (Polyphenylene oxide), PC (Polycarbonate), PBT (Polybutylene terephthalate), etc.

While marking the symbol 7, the respective basic raw material like ABS, PPO, PC, PBT, etc, and mixed shall be indicated below the symbol.

6.2 In addition to the symbol indicated at **6.1**, the end product made out of recycled/reprocessed plastics, wherever possible, shall be marked with 'Recycled indicating percentage of use of recycled material'.

Example: 'This product contains 20 to 30 percent post consumer recycled plastics.'

7.1.2 All medical plastics wastes and containers, used for packaging of toxic contents, such as pesticides, insecticides, shall be segregated separately and put to appropriate incineration to recover energy.

7.2 Segregation

Segregation shall be done in accordance with 4.1.2 of IS 14535 followed by the symbol marked on the product which are taken up for recycling. This

marking will not only facilitate segregation but will also guide customer on the buying and correct usage of the end-product.

7.3 Processing

7.3.1 The segregated plastics waste/scrap irrespective of the source of origin and type/form shall be subjected to size reduction, cleaning from dust/dirt and washing (wherever applicable) with water/detergent, etc. To prevent pollution, appropriate measures shall be taken to dispose of the effluent generated as a result of washing of the waste, as per norms under *Pollution Control Act*, and only thereafter be put to recycling/ reprocessing.

7.3.2 The cleaned and washed material as obtained in 7.3.1, may be blended with additives, processing aids, pigments, etc, as the case may be, and finally granulated by using appropriate screen mesh for filtration of contaminants and impurities.

7.3.3 Efforts shall be made to avoid downgrading the quality and performance of end-products using recycled materials. Necessary levels of performance shall be maintained. If feasible, for individual products, a second and lower level of performance may be used, if the level is separated and clearly defined and it maintains adequate performance requirements. 7.3.4 Reprocessing of dirty coloured plastics post consumer (including recycled earlier) waste and the use of recyclate so generated for the manufacture of critical consumer items like carry bags, blow-moulded containers, water bottles, toys, etc, shall be discouraged as this forms environmentally unsound practice.

7.3.5 The recycled materials shall be designated in accordance with IS 14535.

8 INSTRUCTIONS AND PRECAUTIONS

8.1 A regular check on the working, performance and maintenance particularly on temperature controls, etc, of the processing machinery shall be done.

8.2 Indoor air quality and adequate lighting in the reprocessing unit shall be maintained for healthy working environment with the provisions of suitable exhausts/vents/scrubbers, etc.

8.3 Adequate fire protection measures shall be provided.

8.4 Burning of plastics waste/scrap in garbage dumps or otherwise shall not be permitted.

8.5 The recycled/reprocessed plastics material shall not be used in the manufacture of end-products which come in contact with foodstuffs, pharmaceutical and drinking water.

ANNEX A

(Clause 3.2)

TYPICAL SUGGESTED END-PRODUCTS USING APPROPRIATE TYPES OF RECYCLED/REPROCESSED PLASTICS WASTE/SCRAP

Product/Material

- a) Trash/Garbage bags (PE)
- b) Carry bags (PE)
- c) Office supplies File folders, binder covers, presentation folders, etc (PVC, PE, PP)
- d) Non food containers for detergents, shampoos, petroleum products, pallets, including reusable packaging containers (PE, PP, PS, PET)
- e) Produce containers for agricultural produce, eggs, fruits and vegetable (PE, PP, PS)
- f) Horticultural supplies Planters, trays, flowerpots, nursery bags, tarpaulins ice (PE, PVC, PP, PS)
- g) Building products Wood substitute such as fencing, shingles, etc (PS, PVC, PC)

- h) Municipal supplies Garbage bins, wheel burrows, etc (PE, PP)
- j) Carpets and floor mats, playground equipment's, jacket, T-shirts, sports-wear, geotextiles, tool handles, footwear, luggage, etc (PE, PP, PET, PS)
- k) Recreational equipments Garden furniture, etc, PP— Comparatives (PE, PP)
- m) Twine (Sutli), box strapping for packaging (PP, PE, Nylon)
- n) Pipes and fittings for cable, ducts/conduits SWR, drainage, agricultural (PVC, PE, PP)
- p) Shoes, Chapples (PVC)
- q) Film, sheet for non-food applications (PET, PVC, PE, PP)

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