

# Material Identification Codes

The material identification coding system is a set of symbols placed on plastics to identify the polymer type. It was developed by the American Society of the Plastics Industry (SPI, now called the Plastics Industry Trade Association) but administered by ASTM International since 2008 (ASTM D7611). The coding system is widely used internationally. The main raw material used for the construction of the plastics product is identified for information, as well as to allow efficient separation of different polymer types for recycling. It does not indicate that the product can be recycled neither if it is being recycled.

It is essential to correctly identify the material to be used for the specific pack or article at design stage to plan and accommodate the correct material identification code.

## PACKAGING

**Packaging** products are identified by a material identification code consisting of three chasing arrows in a triangle with a number inside. The major packaging materials are identified with symbols 1 to 6. All other packaging is identified with a number 7. The acronym for the polymer is placed underneath the triangle. Symbols 1 to 6 is only to be used for single layer packaging.

## POSITIONING

For rigid packaging, i.e. bottles, jars, trays, tubs, crates, punnets, tubs, etc., the material identification code forms part of the mould and is moulded into the surface of the product, normally on the base or on the side close to the base. It needs to be legible at arms length. The information is for the recycling value chain and is not aimed at the consumer.

For printed, flexible packaging, it will be printed onto the film as part of the artwork. There is no need to mark clear, single layer films, rather keep it clear. Where multi-layer films are used to pack products in store, material identification codes can be printed on the label or can be in the form of stickers that can be placed onto the in-store printed labels. One example would be vacuum-packed steaks packed in-store.

## NON-PACKAGING

If **non-packaging** plastics products are marked, they should be marked at some place on the surface with the appropriate acronym set between > and < marks.

Table 1: Various polymers, their material identification codes and some product applications

MATERIAL	PACKAGING		NON-PACKAGING	
	Material identification code	Product examples – not all recycled in South Africa	Material identification code	Product examples – not all recycled in South Africa
PET Poly(ethylene terephthalate)		Carbonated drink bottles, mineral water bottles, clear bottles; clear jars, clear trays and punnets for fresh produce and meat; clear barrier films; labels, blister packs; strapping tapes.  PET can also be coloured and tinted but coloured PET packaging items are less common and are not ideal for recycling.  The same code is used for CPET, rPET and APET. It is <u>not</u> for PETG.	>PET<	Carpeting, fibres for apparel and industrial applications; machined engineering components
PE-HD High density polyethylene		Milk bottles, fruit juice bottles, drums, packaging films, carrier type shopping bags, tubs, closures, cosmetic bottles, crates, pallets, bins, jars, closures.	>PE-HD<	Irrigation pipes, shade-cloth, netting, shopping trolleys, refuse- and wheelie bins, high pressure water pipes, optical fibre trunking, cell phone tower “trees”, conveyor rollers, ventilation ducting, automotive components
PVC-P Flexible Poly(vinyl chloride)		Cling film, pouches, cap liners, soft see-through bags for toys and bedding.	>PVC-P<	Cable insulation, gum boots, shoe soles, flooring, matting, medical cloth and tubing, tarpaulins, hoses, safety gloves, soft toys, rain wear
PVC-U Rigid Poly(vinyl chloride)		Clear bottles, jars, blister packaging, food packaging, inserts like chocolate trays, tamper evident neck seals, shrink labels, thin film used for sweet wrappers and sweet packets, flower and gift wrapping.	>PVC-U<	Water pipes, high pressure pipes, conduit, profiles, cladding, stationery foils, plumbing, skirting, cornices, trunking, cooling tower packing, window frame profiles, gutters

MATERIAL	PACKAGING		NON-PACKAGING	
	Material identification code	Product examples – not all recycled in South Africa	Material identification code	Product examples – not all recycled in South Africa
PE-LD and PE-LLD  Low and Linear low density polyethylene		Packaging films, domestic cling film, stretch wrap and stretch lables, shrink wrap, bags, shrouds, dust covers, form-fill and seal packs, peelable lids, cosmetic tubes, boutique shopping bags, bubble wrap, foam sheeting.	>PE-LD<	Irrigation pipes, cable insulation, agricultural films, rotational moulded products like tanks and corner protectors
PP  Polypropylene		Yoghurt tubs, margarine tubs, ice cream containers, bottles, caps and closures, canisters, strapping tape, crates, buckets, jars, cups and vending cups <sup>1</sup> , straws, take-away cutlery <sup>1</sup> , punnets.  Flexible packaging include wrappers, woven bags, clear, crispy packaging films, metallised (printed) films, non-woven cloth, shrink labels, self-adhesive labels. Laminated reverse printed metallised films consisting of various types of PP are also using the no 5 symbol.	>PP<	Coat hangers, battery cases, reels, automotive components, bumpers, furniture, bowls, carpeting, non-wovens, bristles, hair extensions, appliances like toasters and kettles, toilet seats, ropes, fishing nets, fibres for apparel and industrial applications
PS and PS-HI  Polystyrene (general purpose and high impact)		Yoghurt tubs and yogurt portion packs, display boxes, clear trays, punnets and lids for punnets, take-away cutlery <sup>1</sup> , stirring sticks, cake and dessert label sticks, vending cups <sup>1</sup> , tumblers, vending cup lids, bread tags	>PS<	Coat hangers, toys, cups, plates, audio and video cassette housings, CD covers, housings, cell phone covers, stationery items
PS-E  Expanded Polystyrene		Protective packaging, take-away food containers, clamshell packaging, vending cups <sup>1</sup> .	>PS-E<	Vending cups <sup>1</sup> , insulation panels, suspended ceiling panels, seedling trays

<sup>1</sup> Take away cutlery, vending cups and take away food containers can be regarded as packaging as well as non-packaging. South Africa is regarding them nowadays as packaging. Cutlery is made from PP, PS and ABS. Vending cups can be PP, PS or PS-E.

MATERIAL	PACKAGING		NON-PACKAGING	
	Material identification code	Product examples – not all recycled in South Africa	Material identification code	Product examples – not all recycled in South Africa
ABS Acrylonitrile Butadiene Styrene		Tubs, portion packs for margarine and jam, take-away cutlery <sup>1</sup> , glossy re-usable tubs	>ABS<	Cones, reels, bobbins, TV and other housings, toys, automotive components, telephone casings, signage
E/VAC Ethylene(Vinyl acetate)		Cap liners	>E/VAC<	Foam insulation for exercise mats, comfort shoes, shoe soles, hand grips, cable insulation
PMMA Poly(methyl methacrylate) or <i>acrylics</i>			>PMMA<	Signage, light covers, lenses, number plates, reflectors, automotive components, bath tubs, shower basins, mirrors, salad bowls, kitchen utensils
POM Polyoxymethylene or <i>acetal</i>		Aerosol container valves	>POM<	Stationery components, automotive components, curtain accessories, cigarette lighter components, washing peg springs
TPU Polyurethane			>TPU<	Footwear, hoses, mining screens, automotive components
PC Polycarbonate		Re-usable water bottles	>PC<	Lighting, lenses, automotive components, CD's, DVD's, re-usable water fountain bottles, safety glasses, sight glasses, wine- and beer tumblers
PETG Poly(ethylene terephthalate glycol)		Personal care bottles manufactured in smaller volumes and non-symmetrical shapes	>PETG<	Thick sheeting used for structural thermoforming of containers and housings, roof sheeting

MATERIAL	PACKAGING		NON-PACKAGING	
	Material identification code	Product examples – not all recycled in South Africa	Material identification code	Product examples – not all recycled in South Africa
PA Polyamide or <i>nylon</i>		Oven bags, barrier film in meat- and dairy packaging – PA is seldom used on its own as a packaging material.	>PA< >PA GF15<	Automotive components, fishing gut, cable ties, fibres for apparel, zips
Multi-layer PET and PA		Barrier PET bottles used for oxygen sensitive products like wine, beer and energy drinks		
Multi-layer PE and PA		Barrier films used as oxygen and moisture barriers; these materials often has more than two materials but the two most prominent polymers are polyethylene and nylon		
Multi-layer PE and E/VAL		Often used in multi-layer oxygen sensitive tubs, punnets and tubes		

There are various multi-layer materials available and it is not possible to list all of them here. The principles remain the same, if it is not a single material as per 1 to 6, a number 7 is used with the appropriate material acronym(s) underneath.

Please note, there is always an acronym underneath the number 7 symbol. “Other” is not a polymer and cannot be used as it is not informing the recycling value chain.

## RECYCLING SYMBOL

The universal recycling symbol is an internationally recognised symbol for recyclable materials. It consists of three chasing arrows, or Mobius strip. Because the *material identification codes* look very similar to the recycling symbol, they are often regarded as recycling signs. Consumers want to believe that if a product is marked with three arrows, it must be recycled. Materials are only recycled if there is a suitable market for the recycled material and if the economy of scale makes it feasible to recycle.

## ASTM D7611-13

In 2013, ASTM International replaced the chasing arrows graphic – commonly associated with recycling – with an equilateral triangle. There is very little evidence of this internationally and South Africa is still using the chasing arrows.



Figure 1: Mobius Loop



Figure 1: Material identification code for PE-HD according to ASTM D7611-2013.

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