

Other Plastics

A range of plastic materials other than uPVC (see www.level.org.nz uPVC factsheet) is used in buildings. The most common are:

- **Polystyrene (PS)** – This is used as an insulation material between steel sheets or concrete or timber inner and outer skins, as a permanent formwork (which is then plastered) for a concrete wall and as a substrate for a plastered and weatherproofed cladding system (EIFS). The quoted embodied energy for polystyrene is 117.0 MJ/kg for expanded material.
- **Polyethylene / polythene (PE)** – This is used as damp-proofing under concrete floor slabs and to produce synthetic building wraps. PE can be formulated to be hard or flexible without the use of plasticisers, but additives such as UV and heat stabilisers, antioxidants and in some applications flame retardants are used to provide the required properties. The quoted embodied energy for low-density polyethylene is 103.0 MJ/kg. Sheet materials such as concrete underlays are both locally made from imported raw material and imported. PE and cross-linked polyethylene (PE-X) are used for piping.
- **Polybutylene (PB)** – This is used for piping.
- **Polypropylene (PP)** – This is used to produce synthetic building wraps and as a fleece material used in conjunction with modified bitumen roofing products. Additives such as UV and heat stabilisers, antioxidants and in some applications flame retardants are used to provide the required properties.
- **Polyurethane (PU)** – This is used as a component of adhesives, sealants, wet area membranes and clear coatings.
- **Plasticised PVC** – These are used as roofing and decking membranes. PVC by itself is thermally unstable at its processing temperature and thermal stabilisers are needed to make it usable. Another commonly used group of additives are plasticisers, such as phthalates, to make it more flexible. Concerns have been raised over the long-term health effects of some of these additives, although scientific evidence seems inconclusive. Processes are available in New Zealand to recycle plasticised PVC.
- **Ethylene-propylene rubber (EPR)** and ethylene propylene diene monomer (EPDM) – These are elastomeric alloys based upon ethylene and propylene and are used for roofing and window gasket applications.
- **Chlorosulphonated polyethylene and uncured chlorinated polyethylene** – are typically used as roofing membranes.
- **Polycarbonate (PC)** – This is used for translucent wall and roof cladding products and glazing material. Processes are available to reuse polycarbonate.
- **Acrylic sheet, polymethylmethacrylate (PMMA)** – This is used as a glazing material.
- **Polyvinyl acetate (PVAC)** – This is used as the base resin in latex paints, adhesives and surface coatings.
- **Polyvinyl butyral resin (PVB)** – This is used as the interlay in the manufacture of laminated safety glass.
- **Polyvinylidene fluoride (PVDF)** – This is used as a weather-resistant coating, typically on profiled steel claddings.
- **Acrylonitrile-butadiene-styrene (ABS)** – This is used in plumbing fixtures, and with a protective capping layer can be used for bath and shower trays. It also is suitable for interior fittings.
- **Styrene-acrylonitrile (SAN)** – Suitable for interior fittings
- **Acrylonitrile-styrene-acrylate (ASA)** – Used as a protective layer for other less durable polymers for outdoor use.
- **High Impact Polystyrene (HIPS)** – This is a toughened form of polystyrene and is suitable for interior use as sheets and fittings.
- **Polyoxymethylene (POM) / (Poly)Acetal** – Used in plumbing fittings.
- **Polyphenylene sulphone (PPSU)** – This is used as plumbing fittings.
- **Polypropylene Random Copolymer (PP-R)** – This is used to make fusion welded pipes, these are typically green in colour.
- **Bio-polymers** – These encompass materials used for many years, including natural rubber, celluloid and casein, as well as emerging materials based upon starch, polylactic acid (PLA), proteins (zein, soy), polyesters (PTT) and other chemistries. These have potential for use as building materials.