PVC - Polyvinyl Chloride

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A versatile and safe material for the modern world

Polyvinyl chloride (PVC) is synthesised by processing ethylene, from oil or gas, and chlorine from salt, with energy. Its unique properties make PVC the material of choice in many applications, including construction, transportation, electronics and health.

PVC (polyvinyl chloride) is the third most widely used plastic after polyethylene and polypropylene. The European market of PVC resin in 2008 was 6 million tonnes and growing at around 2% per year. Europe represents about a sixth of the world market. The value of finished PVC products made in Europe is estimated at 75,000 million € and more than 530,000 people are employed by the sector.

PVC is efficient in its use of resources, with 57% of its feedstock being salt - one of the earth's most abundant raw materials - and a low energy demand in manufacture. It is also used in many long life applications and can be recycled.

Properties and uses

The inherent properties of PVC make it valuable to many industries. It has a high strength to weight ratio, does not corrode and is very durable.

Main applications are in construction as window frames and shutters

PVC is chemically stable and does not depolymerise. All these properties make this plastic an especially cost-effective material in both economic and environmental terms across a wide range of applications. The price/performance ratio of PVC is one of the best for any material.

About 60% of PVC manufactured has a service life of between 15-100 years. Main applications are in construction as window frames and shutters, water and waste pipes, and electrical applications such as cable and wire insulation.

PVC window profiles and piping last for more than 40 and 100 years respectively, reducing both maintenance costs, consumption or resources and environmental impact. There are also environmental benefits in shorter-life PVC products. For example, PVC used for medical devices such as blood bags , is less-energy intensive to make compared with glass, but it is also lighter to transport, therefore causing comparatively less environmental emission of carbon dioxide. The same comparison is true of the use of PVC versus other materials in car components.

In addition, PVC presents a very low fire hazard. PVC is specified for building materials and its excellent fire prevention properties are widely recognised. It is difficult to ignite, and in the absence of a powerful external flame, will not continue to burn. When PVC does burn it releases hydrogen chloride, which irritates the nose and can provide an early warning of fire. Some carbon monoxide is also formed, but comparatively little heat. Carbon monoxide and heat are the major causes of fire deaths. Furthermore, the production of dioxins in PVC fires is so low that no health effects have ever been detected in exposed people and fire-fighters

PVC acts as a barrier against air, oxygen, moisture and odours, and has anti-bacterial properties, helping to keep packaged food fresh and clean. It also is used in medical applications from packing phar-

maceuticals to hospital flooring. Blood stored in PVC bags lasts much longer than other storage methods.

Concerns over various additives, which are used to give different properties to PVC, are being addressed by industry. Progress has been made towards ensuring the sustainable use of additives. By 2011, the consumption of lead stabilisers decreased by 71.4 per cent in the EU-27 compared to 2007 and remains on track for complete substitution by 2015. This trend has been supported by the corresponding growth in calcium organic stabilisers, used as an alternative to lead-based stabilisers.

PVC is a top material for medical applications

Production

Production of PVC involves the polymerisation of vinyl chloride monomer (VCM), which can cause a rare form of cancer. For 30 years the European industry has operated safely below the operational exposure limit. In addition, monitoring outside production plants indicates that VCM emissions are also below the operational exposure limit. Furthermore, emissions of dioxin from PVC manufacture are small compared to other sources.

Recycling and disposal

The first year results of the new ten year PVC sustainability initiative – VinylPlus – were presented at the close of the European PVC Value Chain's 2012 annual meeting. Despite significant challenges caused by the economic crisis, results indicate that the industry is on track to achieve the VinylPlus sustainability goals for 2020 set last year following the successful completion of its predecessor Vinyl 2010. Under VinylPlus, the industry has set ambitious targets of recycling per year 800,000 tonnes of PVC in Europe by 2020. Thanks to the consolidation of collection and recycling schemes for PVC, 257,084 tonnes were recycled in 2011. This is despite continuing adverse market conditions and the decrease in volumes of PVC waste in construction.

For PVC waste that cannot be economically recovered and recycled, the best option is incineration with energy recovery. In this case, plastic is an important constituent of waste as it provides the calorific energy necessary for burning. The chlorine in PVC helps to remove heavy metals during incineration, producing a cleaner slag that can be reused in construction.

The presence of PVC in waste does not appear to increase dioxin formation during incineration. Dioxin emissions are controlled through correct operation of the incinerator and containment. Measurements have shown that the contribution of PVC to the formation of dioxins in a fire is no greater than that from natural materials, such as wood.

The use of landfills for waste is the last option. PVC is inert in landfills, and there is no evidence that it creates gases or increases toxicity of any leach ate. While PVC is not biodegradable, its additives are.

Euro Chlor Position on PVC

Euro Chlor strongly supports the PVC industry and its applications. The industry is responsible and operates to the highest standards. The PVC industry is also working through the production chain to improve the environmental impacts of PVC, which is an inherently sustainable product.

The image of PVC has been negatively affected in the past by adverse publicity generated by environmental organisations that often ignore scientific or economic realities. As a result, there has been a gap between fact and public perception. However, recent attitude surveys undertaken with the industry's stakeholders and consumers have indicated that this gap between perception and reality is narrowing and consumption of PVC indicates that the plastic's versatility and qualities are still much valued by society.

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