Vinyl in Construction
- building a sustainable future

Good for Life...
Good for the Environment
Construction professionals, architects and designers have been breaking new ground in creativity, versatility, performance and safety with the help of vinyl (PVC). Specifiers are finding cost-effective solutions with PVC, which contribute both to society and to environmental sustainability.

And the vinyl industry itself has gone further. The European PVC Industry is meeting the challenge of sustainable development head on by committing to a set of rigorous pledges on raw material manufacture, additives and waste management including recycling in the Vinyl 2010 Voluntary Commitment.

The UK’s first solar-powered office block – sponsored by the EU, DTI and Greenpeace at Northumbria University, Newcastle on Tyne features 21,000 solar cells and 646 PVC-U windows to assist thermal efficiency throughout the building.
Safe – proven over half a century of building and design

Versatile – creates freedom in design and construction

Strong and lightweight – mechanically strong and abrasion resistant

Durable – resists weathering, impact, UV and chemical degradation

Inherently fire resistant – difficult to ignite and keep alight

Cost-effective – offers excellent cost performance advantages

Environmentally sound – Government and independent studies show PVC to be at least as environmentally sound across a full life-cycle as other common construction materials

Excellent electrical insulation – universally used for cables and cladding

Recycled or recyclable – proven second life uses include pipes, window profiles and flooring

Choice – a wide range of applications, colours and finishes according to application

No other single material offers all of the above properties to architects, builders and developers.

Building & Construction applications

- Window and door profiles
- Architectural glazing systems
- Pipes and fittings
- Power, data and telecoms wiring and cables
- Cable and services ducting
- Internal and external cladding
- Conservatories and atria
- Roofing ceiling systems and membranes
- Rainwater, soil and waste systems
- Flooring
- Wall coverings
- Safety clothing and signage
PVC in Building & Construction
- an overview

Versatile

There are virtually no limits to how PVC can be used in construction applications. Rigid or flexible, it will not corrode or rot; offers high strength and light weight; can be moulded or extruded into almost limitless shapes, from wafer thin to strong sheet or fabricated into high-impact profiles; and can be made available in a wide range of colours, finishes and textures.

Importantly, this vast range of benefits does not come at a prohibitive cost.

For more than fifty years, PVC has found extensive use in many different construction products, including window and door profiles, pipes and fittings, cabling, flooring and wallcoverings.

Durable

PVC has been described as an “intelligent material” because of its use in every part of our lives – from blood bags to humble household cling film, from double glazing to underground pipes. Its contribution to our built environment is one of the best examples of a modern material adapting to the needs of an ever-changing society.

At a time when there is concern about the changing climate, PVC performs to meet human needs. PVC construction products are highly resistant to the elements, whether under intense ultra-violet light or pounding rain. PVC’s stabilised resistance to indoor artificial light is also important.

Unlike many metal, glass or wood building products, there are virtually no limits to how PVC can be used in construction applications.
Whichever way you look at PVC, it is one of the safest materials you can use in building and construction. PVC meets all international standards for safety and health for the applications in which it is used.

PVC contributes to building safety because it is inherently flame retardant. 57% of the raw material for PVC is based on salt, which makes it an intrinsically self-extinguishing polymer. This is one of the reasons PVC has been historically used for conveyor belts in mining. It is very difficult for PVC to actually catch fire and it does not continue to burn when a flame source is removed.

Nor is PVC a particular problem in a building fire. Such a fire would have to be very extensive to reach a stage where HCl was given off, when there would already be fatal levels of carbon monoxide, the biggest killer in fires, from the burning of all materials in the fire.
PVC does not warp or rot and is highly resistant, making it ideal for roofline drainage, cladding, fascias, soffits and bargeboards.
Window profiles
PVC represents a good economic and ecological balance compared to alternatives and, because little maintenance is required, PVC avoids the need for cleaning chemicals, solvents and paint.

Cladding
PVC cladding is an attractive way of adding value to a property. It offers high resistance to the elements and requires little maintenance.

Roofline drainage, drainpipes, soffits, bargeboards
(see below)

Conservatories and atria
PVC is a strong and durable construction material allowing mass-produced or one-off designs for applications such as conservatories, swimming pool rooms and atria.

Wallcoverings
PVC wallcoverings offer the widest variety of finishes in domestic or commercial buildings. From fashionable printed vinyl wallpaper to high-tech specialist coverings in areas such as operating theatres.

Flooring
(see below)

Damp-proof course
PVC is impervious so an ideal material for damp-proofing walls.

Cabling
(see below)

Ducting for cables
Lightweight, modular ducting allows easy access to building services including water, power and telecoms.

Pipes and fittings
Economy, easy installation, chemical resistance, good flow properties, and minimal maintenance all mean significant advantages for PVC pipes and fittings in construction products.

Cabling for TV
(see below)

Doors
Better sound and heat insulation together with improved security are just some of the benefits of a welcoming PVC door.

Data/Power Cables
PVC’s fire retardancy and excellent insulation properties help make it the globally preferred material for the sheathing around electrical, data and telecoms cables.

Flooring
Vinyl flooring is a well-established product with over 50 years of successful use. Durable and easy to install, such floor coverings come in a wide range of styles and find use in every type of building, from hospitals and offices to domestic dwellings.
An Environment checklist

Raw Materials

The essential raw materials for PVC are based on salt (57%) and oil (43%). The electrolysis of salt water produces chlorine which is combined with ethylene, obtained from oil, to form vinyl chloride monomer (VCM).

Molecules of VCM are linked through a process called "polymerisation" to form a fine white powder which, when mixed with additives, gives PVC its special qualities.

Production of PVC takes place in sealed vessels. Compared with other materials, PVC production uses relatively low energy consumption and all environmental impacts are rigorously regulated.

PVC in Use

PVC is the world's second most popular plastic and is used in absolute confidence in every part of modern life. PVC is the most widely studied and researched of all polymeric materials. Choosing and using PVC poses no greater risk to people or the environment than any other material.

PVC is essential in life-saving applications such as blood bags, catheters and surgical tubing. PVC packaging is used in food applications such as cling film and produce trays and in non-food applications such as blister packs for everything from pharmaceuticals to DIY products. PVC is relied upon in the automotive sector and for leisure goods from suitcases to bouncy castles. But the largest users of PVC are building and construction businesses around the world.

PVC also brings benefits to building owners and users because it requires little maintenance throughout its lifetime.

Vinyl 2010 Voluntary Commitment

The European PVC Industry is meeting the challenge of sustainable development through the Vinyl 2010 Voluntary Commitment. This Voluntary Commitment outlines rigorous targets aimed at improving the sustainability of PVC and focuses on three specific areas: raw material manufacture, additives, and waste management including recycling of post-consumer waste.

The PVC Industry is represented by four organisations at European level, who have united to form 'Vinyl 2010':

- European Council of Vinyl Manufacturers (ECVM)
- European Plastics Converters (EuPC)
- European Stabilisers Producers Association (ESPA)
- European Council for Plasticisers and Intermediates (ECPI)

In the UK, the BPF is the natural platform for Vinyl 2010.

Vinyl 2010 includes the following key commitments:

- Compliance to ECVM Charters regarding environmental standards of PVC production, which go beyond regulatory requirements
- A plan for full phase-out of lead stabilisers by 2015, in addition to the phase-out of cadmium stabilisers which was achieved in 2001
- Recycling of 50% of the collectable available post-consumer PVC waste for window profiles, pipes and fittings and roofing by 2005 and for flooring by 2008

Implementation of these commitments is taking place now, with national trade associations such as the BPF in the UK, taking a lead in bringing relevant stakeholders together.

You can find more information at www.bpf.co.uk and www.vinyl2010.org
Manufacture

All of the processes in modern PVC manufacturing utilise advanced environmental control technologies within closed loop production units to ensure there is no undue risk of environmental damage at any stage of manufacture.

These manufacturing processes are carried out according to strict regulatory controls including, in the UK, the Integrated Pollution Prevention and Control regulations. Production plants are monitored and routinely inspected in the UK by the Environment Agency and the Health & Safety Executive.

To demonstrate their commitment to environmental leadership, Europe’s largest PVC raw material producers have gone further than is required by legislation. The European Council of Vinyl Manufacturers has created its own Charter for the production of VCM (Vinyl Chloride Monomer) and PVC and the main UK producers have agreed An Environmental Charter for UK PVC Manufacturers and An Eco-efficiency Code Of Practice for the Manufacture of Suspension PVC.

Although it has been argued by environmental extremists that PVC production is responsible for dioxin levels in the atmosphere, this is not the case.

Dioxins can be produced via a wide variety of artificial and natural processes. All of the research carried out points to the fact that PVC is a statistically insignificant contributor to dioxin levels. In fact, during a period when PVC production has doubled, dioxin levels have actually fallen by 50%.

Waste Management & Recycling

PVC used in building applications may be expected to give more than forty years of useful life. For this reason alone, the opportunities for large-scale PVC recycling are still limited by the availability of waste material. However, there are proven and successful PVC mechanical recycling schemes in operation across Europe which are turning used PVC into applications such as pipes, ducting, flooring and window profiles. Even PVC cable looms are being stripped and recycled.

Specifiers should have no concerns, however, even when used PVC enters traditional waste streams. PVC can be safely burned within a modern energy-from-waste incineration process, as part of the mixed waste stream. Because of its high caloric value, the incineration of PVC is a positive contribution to energy recovery. Furthermore, several expert studies in the UK and Germany show that, in the incineration process, PVC makes no difference to the level of dioxins created by other materials.

Even when PVC finds its way into landfill, extensive research has shown it does not present a significant risk to health, safety or the environment. In fact, PVC membranes are often specified by waste management professionals to line landfill sites and aid methane recovery.
PVC has recently received a number of assessments from independent authorities around the world.

In 2004, an extensive review of Life Cycle Analysis (LCA) work by consultants PE Europe for the European Commission, sought to put material choice into specific context and found no reason to treat PVC differently from other construction materials.

The PVC Industry in Europe is addressing the challenge of sustainable development through the Vinyl 2010 Voluntary Commitment. Progress is monitored independently with involvement from the European Commission itself.

In the UK, the industry continues to pioneer research and development work to address Vinyl 2010 objectives, and this has included working with the UK Government’s Waste and Resources Action Programme (WRAP).

The industry is also keen to explore long term sustainability issues, working with Jonathon Porritt at Forum for the Future, to examine PVC using The Natural Step framework, and the Institute for Polymer Technology and Materials Engineering (IPTME) at Loughborough University, who are co-ordinating blue-sky research into PVC’s sustainability, funded by the Engineering and Physical Sciences Research Council (EPSRC).
An Environmental Guideline Report published by the Dutch Foundation for Building Research (April 1996) and officially sponsored by the Dutch Ministry of the Environment (VROM), lists PVC as an environmentally preferred material for almost all applications in housing construction.

"[The balance of evidence suggests that there is no alternative material to PVC in its major product applications that has less overall effect on the environment."


An extremely important point was registered by the DTI as part of its “Technology Foresight Programme in which PVC was cited as a key element of the chloralkali industry:

"PVC is perfectly safe and this is why it is used for bottles for mineral water, bags for blood transfusions, and fine bore tubing that is inserted into premature babies. PVC can be crystal clear or as black as coal, it can be as rigid or as flexible as we choose. It will stand up to extreme conditions and so is greatly used for windows, water pipes and insulation for electric wiring. Britain, with its abundant supplies of salt and natural gas, is an obvious place to manufacture this versatile plastic."

"I am pleased that the PVC industry already has a voluntary commitment setting out a programme of precautionary measures to address potential risks and encourage industry to meet the challenge of sustainable development”

Rt Hon. Michael Meacher MP, Former Minister for the Environment in the DETR press release prefacing the DETR Life Cycle Analyses of PVC and Alternatives (March 2001)

"The past year saw the publication of our 2020 Vision report on PVC … our report addressed … concerns and developed a series of key challenges if PVC is to become sustainable across its whole life cycle. This work has gained the Forum new credibility with retailers and manufacturers and stimulated widespread media coverage. In these ways it has also succeeded in making people think more strategically and constructively about the future of PVC and other potentially sustainable materials.”

Extract from the Forum for the Future Annual Report 2001

\[On the balance of probabilities], none of the evidence reviewed provides an overriding scientific reason for the PVC Retailers’ Group to immediately abandon the use of PVC in either food packaging or building/insulation materials. . .[provided that] the Retailers’ Group is able to satisfy itself that the PVC it purchases is responsibly manufactured, used and disposed of...“

A study on environmental health impacts of PVC in packaging and construction materials, carried out by The National Centre for Business & Ecology (June 1997).

"As far as I am aware, no member of the public has ever been harmed by PVC, and many people owe their lives to it. It is time we learned to live in peace with a rather wonderful plastic.”

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