

REYNOLON® PVC SHRINK FILM



A RESPONSIBLE PACKAGING CHOICE



REYNOLON® PVC FILM FACTS & INFORMATION

For five decades, Reynolon Shrink Film has been providing safe, effective ways for manufacturers to wrap, ship, and protect their products.

Reynolds takes the responsibility of protecting our employees, communities, and the environment while producing quality products very seriously. To help our business partners and the community understand our environmental position, we have printed this booklet to shed some light on Reynolon Shrink Film and our processes.



Our customers have come to rely on Reynolon® Shrink Films' custom engineered properties to provide a high quality display package. Reynolon films' strength, durability, high gloss and sparkling clarity are well-known in the industry. In addition to these product advantages, Reynolon Shrink Film can be considered a responsible, sustainable packaging choice.

PRODUCT SAFETY

The manufacture, conversion, and use of polyvinyl chloride (PVC) products is quite safe. In fact, many PVC products have been approved for use in medical devices or for food contact by the United States Food and Drug Administration (FDA).

The manufacture of PVC and PVC products, like all products produced in the United States, is regulated by the Occupational Safety and Health Administration (OSHA), as well as the Environmental Protection Agency (EPA), which ensure that the manufacture of products is safe for workers, our communities, and consumers, and does not cause harm to the environment.

What is PVC? Each of us comes in contact with PVC or one of the materials used to produce PVC every day. PVC pipes transport drinking water to and within our homes, and the material is used to store and dispense lifesaving blood in hospital emergency and operating rooms. PVC is also the primary material from which we produce Reynolon Shrink Film.

Components of PVC. The base raw materials of PVC are salt, also known as sodium chloride (NaCl), an abundant, virtually inexhaustible material, and fossil fuel sources oil or natural gas. Salt comprises 57% of the starting raw materials for PVC. The remaining 43% comes from fossil fuel sources. This reduced petroleum requirement makes PVC a more environmentally responsible material than

other plastics since the manufacturing process doesn't rely entirely on fossil fuels.

In the PVC manufacturing process, chlorine gas is produced from NaCl and combined with natural gas to produce a product called vinyl chloride monomer (VCM). VCM is then further processed to produce PVC.

PVC is a very versatile material and can be combined and processed with various additives to produce products ranging from rigid PVC piping to flexible cling film for wrapping sandwiches, to medical products like blood bags. In the case of Reynolon PVC film, the key additives are stabilizers and plasticizers, both of which are safe and effective.

Facts about Chlorine. In nature, chlorine combines readily with many other elements, and exists in various naturally occurring compounds. The most common example is table salt. Chlorine is used to disinfect 98% of U.S. drinking water, is utilized in 85% of the pharmaceuticals being manufactured today, and is chemically stable in products.

PVC is manufactured using chlorine gas. This gas, used in numerous industrial processes, is an extremely useful material but is inherently hazardous. Domestic manufacturers employ very strict controls, as regulated by OSHA, to ensure safety of its use in manufacturing. It is important to note PVC products, including PVC film, do not contain chlorine gas.

Stabilizers and Plasticizers used in Reynolon Shrink Film are safe. Stabilizers are added to PVC in order to protect the molecules from the high temperatures that are necessary to melt the PVC and extrude it into a thin, colorless film.

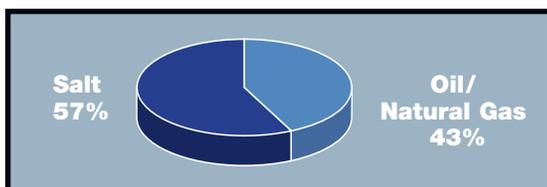


Figure 1 – Raw materials required to produce PVC

Source – The Facts about Vinyl – Vinyl Institute presentation, April 27, 2006

In early PVC film production, and in some foreign countries today, heavy metals, such as cadmium and lead, elements deemed harmful to the environment, were used as stabilizers. All Reynolon films utilize safe stabilizers and meet Coalition of Northeastern Governors (CONEG) legislation and California Proposition 65.¹ No cadmium or lead is used to produce Reynolon film.

Plasticizers are used to make vinyl soft and pliable. All of the plasticizers we use to produce Reynolon films are approved for use in food contact applications by the FDA. There has been an increasing amount of concern about plasticizers, particularly phthalates, not being safe, even though they have been approved for use by the FDA. We do not use phthalates in the production of our PVC films.

OSHA regulation of VCM. In 1974, OSHA adopted safety and handling rules for those operations where vinyl chloride monomer (VCM), the single unit of a PVC molecule, is manufactured, reacted, released, repackaged, stored, or used. OSHA ruled that employees in fabricating plants should not be exposed to more than an average of one part per million (ppm) of VCM in the air, measured over an eight-hour working day. Employees monitored at the Reynolds Reynolon film manufacturing facility for airborne VCM during an 8-hour workshift showed non-detectable exposure levels of VCM. (Detection limit < 0.1 ppm.)

ENVIRONMENTAL IMPACTS OF PVC

PVC is produced using less fossil fuel than other plastics sometimes identified as “better” alternatives. In addition, PVC films require less energy in the packaging process and allow for an overall reduction in packaging materials.

Less petroleum based products are required to produce Reynolon Film. Chlorine is one of the building blocks of common table salt, or NaCl (sodium chloride).

Salt (an abundant resource) comprises 57% of the raw material required to manufacture PVC, with the remaining 43% limited to petroleum (natural gas). Figure 1 above is a graphical representation of the source of raw materials required to produce PVC. Less reliance on fossil fuels makes PVC a more environmentally compatible choice for packaging materials when compared to the predominantly oil or natural gas based polymers such as polyolefins.

Low air gas emissions. PVC has lower green house gas emissions, like carbon dioxide (CO₂), during its manufacture than many other alternative materials. These include polyethylene terephthalate (PET) and polypropylene (PP), whose emissions are virtually two times greater.² In addition, PVC is not a significant source of dioxin in the atmosphere. Vinyl resin manufacturing is a very small dioxin source, comprising 0.4% of the dioxin emissions into the atmosphere compared to natural sources of dioxins, such as forest fires, which equal 61%.³

Highly sustainable resource content. For many of the Reynolon films, salt is not the only non-fossil fuel raw material. In fact, two of the plasticizers used in the production of Reynolon films are derived from renewable resources: soybean oil and tree oil. When all the additives are considered, some Reynolon film formulations contain as much as 65% of materials that are not petroleum-based.

The candy canes below have been wrapped in Reynolon 2023 film, which is plasticized with a soybean oil-based material.



Less energy is required to wrap product in Reynolon Shrink Film. Not only are less petroleum based products required to produce Reynolon Shrink Films, but lower temperature shrink technology allows for faster line speeds, higher output, lower maintenance costs and decreased energy costs. Shrink tunnel temperatures required to shrink Reynolon film are much lower than those required to shrink polyolefin films, often as much as 50 degrees Fahrenheit. These lower tunnel temperatures use less energy not only by requiring less energy to heat the tunnel but also by decreasing the need for additional air conditioning for operator comfort.

Utilizing Reynolon Film can allow for an overall reduction in packaging materials. PVC film is an excellent vehicle to help reduce the overall packaging materials used for a product. Due to PVC film's low shrink force and the ability to customize the shrink percentages, primary packaging, such as chip board in cartons or backing board can be reduced or eliminated without the final product warping or deforming due to the influence of the shrink force of the film. Examples of such applications are home air filters and light weight printed material wrapped without backer board.

Also, since PVC film has customized shrink qualities such as low and high preferential shrink, and low, medium and high biaxial shrink, allowing for customized shrink percentages in two directions across a package, Reynolon film can be tailored to specifically fit unique applications, like gift wrap.



Recycling and disposal of PVC. Two elements make up what we consider overall recycling programs: the reuse of scrap materials generated in manufacturing plants, normally called reclamation; and the reuse of postconsumer materials, generally regarded as recycling.

Manufacturers of PVC film products reclaim nearly 100% of their scrap within their operations. The Reynolon film closed-loop manufacturing process efficiently uses pre- and post-process scrap and film trim, which are reground and utilized for future film production. Most waste that is not immediately reclaimed into the manufacturing system is sold to waste processors and is then used as raw material for applications such as carpet backing.

The Vinyl Institute promotes and works with recyclers to facilitate vinyl recycling. Over 1 billion pounds of vinyl is recycled annually.³ New technologies to sort PVC and other plastics are in commercial use. Recycled PVC is being made into construction products, irrigation pipes and numerous other non-packaging products.

Where recycling is not available, PVC can be safely disposed of in landfills or through incineration. PVC is no stranger to effective landfill facilities. Modern landfills are, in fact, often lined and capped with heavy duty PVC to provide a watertight and chemically inert base to provide protection against leaching from any materials contained within the landfill. In addition, PVC films in landfills are stable and do not decompose.

It is also safe to incinerate PVC packaging materials. The EPA and regulatory agencies worldwide have reviewed the issue and concluded that burning PVC in a properly operated waste-to-energy solid waste incinerator does not affect dioxin and furan emission levels.⁴



PVC film conclusions. PVC film is an environmentally responsible choice for flexible packaging material. Reynolon PVC film requires less fossil fuel to be produced than alternative products and may allow for overall reductions in packaging materials. Reynolon film is safe for consumers, the people involved in its manufacturing and use, and does not cause harm to the environment.

REYNOLDS AND THE ENVIRONMENT

Reynolds Packaging Group defines sustainability as using our values to build financial success, environmental excellence, and social responsibility through partnerships in order to deliver net long-term benefits to our shareowners, employees, customers, suppliers, and the communities in which we operate.

In order to be sustainable, we need a deep understanding of our customers' needs so that together we can find the "right" solution, be it a packaging product solution that enhances source reduction through lightweighting/rightgauging, a packaging product solution that improves barrier and protection properties so other packaging components can be modified for recycling and/or reduced, a flexible packaging solution that relies less on fossil fuel in its raw material structure, or packaging product solutions that are manufactured from renewable resources. Reynolds Packaging Group is rapidly developing packaging products within each of these key areas of packaging sustainability.

In addition to working with our customers on their sustainability challenges, each of our plants actively seeks ways by which they can decrease their environmental footprint. Each of our facilities is working to meet reduction goals set by our management team and is working with environmental specialists in order to determine additional uses for materials that would normally be sent to local landfills.

Reynolds, a leading foil packaging company, has a rich history in being part of a fully integrated aluminum company, having the capabilities to extract raw materials, process them into aluminum, convert the metal into end-use products or make them available to others for further processing, and recycle aluminum products at the end of their useful life. We also manufacture a wide variety of products from plastics. We typically purchase the resins — polyethylene, high-density polyethylene, polyvinyl chloride, polystyrene and polypropylene — and convert them to semi-finished and finished products. Through our intimate knowledge of the aluminum life cycle, we are aware of the importance of materials flow throughout the economies of the world, and we recognize the need to make efficient use of all raw materials and natural assets. To that end, we have developed a materials flow analysis, in conjunction with the International Aluminium Institute, to better understand the global flow of aluminum production, aluminum flows and inventories in customer and consumer products, and recycling loops. This material flow analysis is also being used to quantify and better understand the industry's current and future environmental aspects and improvement opportunities. We believe that there is economic as well as stewardship justification for minimizing material flows, and we continue our work to make all of our processes as efficient as possible.

1 CONEG legislation requires that packaging products do not contain heavy metals at concentrations above 100 ppm. California Proposition 65 assures the consumer that a business will not knowingly expose a person to hazardous levels of carcinogens or reproductive toxins, without providing a "clear and reasonable warning."

2 GUA—Gesellschaft für umfassende Analysen 2004, included in The Facts about Vinyl—Vinyl Institute presentation, April 27, 2006

3 The Facts about Vinyl—Vinyl Institute presentation, April 27, 2006

4 US EPA Inventory of Sources of Dioxin in the United States (External Review Draft 2005 <http://www.epa.gov/ncea/pdfs/dioxin/2k-update/>)



PRODUCT INFORMATION

Reynolon Shrink Film is an industry leading premium over-wrap film that has been utilized and trusted to protect and display retail products for over 50 years. Polyvinyl chloride (PVC) and other components are custom blended to provide a wide range of products with specifically engineered properties. Our ability to customize our film formulations, combined with the unique properties of PVC, enables Reynolds to produce a line of products that provide tailored shrinkage for clean, virtually wrinkle-free packages with no dog-ears or unsightly tears or holes. In addition to the various technical advantages of PVC films, many of the Reynolon film products are also approved for food contact per FDA regulations and have been certified as Kosher by the Orthodox Union.

For additional information about Reynolds or Reynolon film products, please visit us at www.reynolon.com.



Reynolon® Shrink Films

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