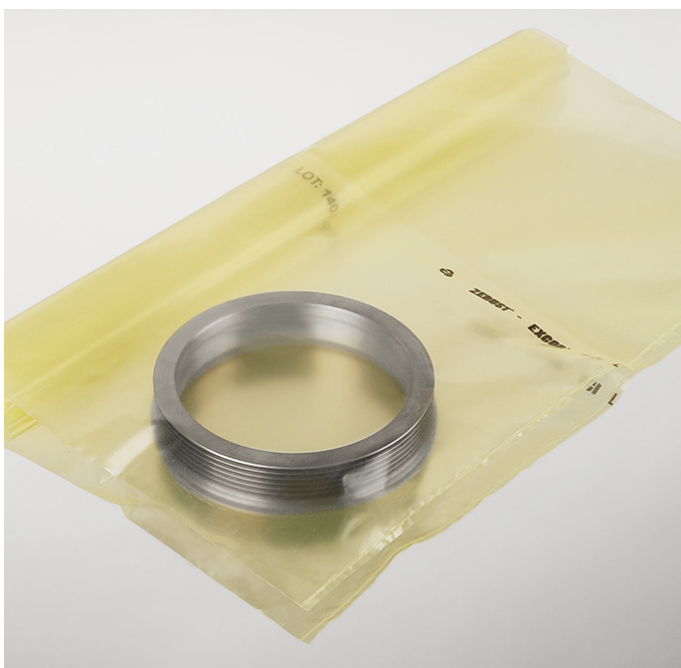




ZERUST®  **EXCOR®**

REDUCING YOUR VCI PACKAGING CARBON FOOTPRINT



ZERUST® is a product of
Northern Technologies
International Corporation



WHY CHOOSE ZERUST®?

COMMITMENT TO THE ENVIRONMENT

At ZERUST®, we are committed to creating a more sustainable future. We convert environmentally beneficial materials into value-added products and services for industrial and consumer applications. Our research and development teams deliver innovative technologies and products that address climate change, use renewable materials, and enable sustainable waste management. We do this while maintaining the highest performance and processability.



ENVIRONMENTAL BENEFITS OF ZERUST® PRODUCTS



- **Reduced Need for Hazardous Materials:** ZERUST®'s corrosion inhibitors often replace more hazardous rust-prevention methods, like oil and solvent-based coatings, which can be harmful to the environment.
- **Longer Lifespan of Metals:** By effectively preventing rust and corrosion, ZERUST® products extend the lifespan of metals. This reduces the need for frequent replacements, thereby lowering the demand for new metal production, which is a process that often involves significant environmental impact.
- **Less Waste:** With a longer lifespan of metal components, less scrap metal and waste are generated. This helps reduce landfill use and the environmental harm associated with metal disposal.
- **Energy Conservation:** By protecting metals against corrosion, ZERUST® can help maintain the efficiency of

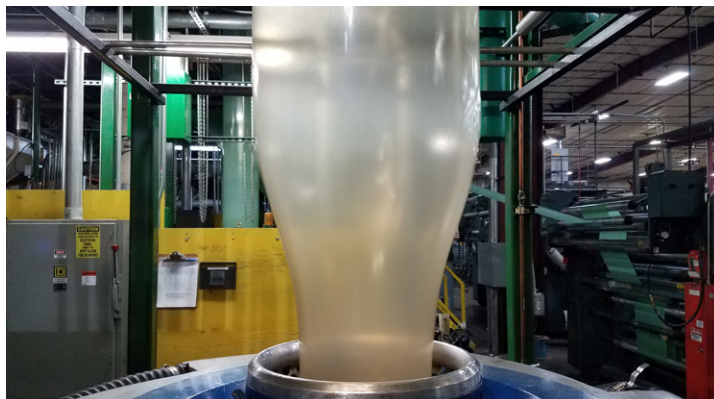
mechanical systems and structures. Efficient systems consume less energy, contributing to reduced carbon emissions.

- **Safe for People and Environment:** ZERUST® formulations are typically designed to be non-toxic and safe for both people and the environment, making them a preferable option over more hazardous rust-prevention chemicals.
- **Recyclability:** ZERUST® VCI Poly and VCI Paper products are recyclable, which further aids in waste reduction and promotes a circular economy.
- **Low VOC Emissions:** Many ZERUST® liquid products have low volatile organic compound (VOC) emissions, which is beneficial for air quality and reduces harmful atmospheric pollutants.
- **Carbon Footprint Reduction:** ZERUST® incorporates recycled resin from consumer and industrial sources into our VCI Film, significantly reducing the carbon footprint by saving energy and decreasing greenhouse gas emissions. This approach underscores our dedication to sustainability and supports our commitment to environmental responsibility.

POST-CONSUMER RECYCLING

LEADING THE WAY IN SUSTAINABLE VCI PACKAGING WITH POST-CONSUMER RECYCLING

In a world where environmental consciousness is on the rise, companies are increasingly seeking innovative ways to reduce their carbon footprint and promote sustainability. One such approach that's gaining traction is post-consumer recycling, and here at ZERUST®, we're at the forefront of implementing this technology across our Vapor Corrosion Inhibitor (VCI) polymer packaging solutions that are commonly used to protect metal components and equipment from corrosion during storage and transportation. By incorporating post-consumer recycled materials into our VCI polymer packaging products, ZERUST® is reducing the demand for virgin plastics and promoting the circular economy.



Replacing 100 metric tons (100,000 kg) of conventional polyethylene plastic VCI packaging with ZERUST® ICT®510-PCR30 VCI poly, which incorporates 30% recycled resin, results in a remarkable carbon reduction of 26,000 kg (57,320 lbs.). This achievement is equivalent to*:



95-ton reduction in CO₂ emissions for every 100 metric tons of VCI film.



Reduction in CO₂ emissions equivalent to 21 cars driven for a year for every 100 metric tons of VCI film.



Reduction in CO₂ emissions equivalent to the consumption of 10,727 Liters of gasoline for every 100 metric tons of VCI film.



Reduction in CO₂ emissions equivalent to the carbon sequestered by 1,576 tree seedlings grown for 10 years for every 100 tons of VCI film.

*WARN MODEL. Source: US EPA Greenhouse Gas Equivalencies Calculator (as of February 2024).

UNDERSTANDING POST-CONSUMER RECYCLING

Post-consumer recycling is a process that revolves around the collection, processing (sorting, washing, grinding, extruding), and reusing materials and products that have been discarded by consumers. This approach is vital for reducing waste, conserving resources, and mitigating the environmental impact of traditional disposal methods like landfills and incineration.

POST-CONSUMER RECYCLING

IMPORTANCE OF POST-CONSUMER RECYCLING TO THE ENVIRONMENT:

- 1. Waste Reduction:** Recycling diverts materials from landfills and incinerators, helping to save space and reduce their harmful environmental effects. Landfills can release toxic chemicals and greenhouse gases, while incineration contributes to air pollution. A report from Environmental Action (EA) reveals that in 2023, approximately 68.6 million tons of plastic was discarded into the natural environment. This situation arises from a discrepancy between the amount of plastic used and the ability to effectively handle it once it reaches the end of its life cycle.
- 2. Resource Conservation:** Recycling plays a pivotal role in the conservation of our planet's resources, particularly in the realm of petroleum-based polymer products. By embracing Post-Consumer Recycling (PCR), we can significantly diminish the demand for virgin materials. This is especially critical for products derived from petroleum, a resource that takes millions of years to form. PCR not only aids in reducing our reliance on oil but also mitigates the ecological impact associated with extracting new resources.
- 3. Energy Savings:** The recycling of post-consumer polymers is notably energy-efficient, presenting a marked benefit compared to manufacturing new polymers in refineries. This process's energy efficiency results in considerable energy conservation.
- 4. Pollution Reduction:** PCR assists with curtailing environmental pollution, offering a greener alternative to the extraction and processing of raw materials. Unlike the practices employed in refineries, which are known to contribute heavily to environmental pollution, PCR operates with a much smaller ecological footprint. By recycling, we actively reduce the pollution of air and water and help in preserving natural ecosystems. This is because PCR avoids the detrimental effects of habitat destruction and soil erosion often associated with the extraction of oil. Emphasizing PCR not only aligns with sustainable practices but also marks a crucial step in diminishing the extensive environmental pollution caused by traditional refining processes, thereby playing a pivotal role in safeguarding our planet's health.
- 5. Economic Benefits:** PCR not only contributes significantly to environmental sustainability but also offers considerable economic advantages. The recycling industry is a growing sector that creates job opportunities, thereby stimulating economic growth. While currently in its nascent stages, as the worldwide infrastructure for recycling expands, we can expect a more pronounced reduction in costs associated with material production and waste processing. This economic benefit, coupled with environmental sustainability, positions PCR as a key driver in both ecological and economic advancement.
- 6. Conservation of Space:** Landfills are limited in capacity, and locating appropriate sites for new ones becomes progressively challenging; PCR offers a sustainable solution. By redirecting materials away from landfills and into recycling streams, we can significantly extend the lifespan of existing disposal sites. This not only helps in preserving precious land but also safeguards ecosystems that might otherwise be compromised to accommodate waste disposal. The effective management of space through PCR underscores its importance in maintaining ecological balance and highlights its role in the responsible stewardship of our environmental resources.
- 7. Circular Economy:** Recycling is a cornerstone of the circular economy, where products and materials are designed for reuse and recycling. This approach minimizes waste and resource consumption, promoting sustainability.

POST-CONSUMER RECYCLING

WHY YOUR COMPANY SHOULD CONSIDER THE USE OF ZERUST® POST-CONSUMER RECYCLING VCI PRODUCTS

The growing interest of companies in Post-Consumer Recycled (PCR) materials, particularly PCR polymers like polyethylene and polypropylene, is driven by several compelling factors:

1. Regulatory Compliance and Market Incentives:

Ambitious initiatives like the U.S. Plastics Pact, spearheaded by The Recycling Partnership and the World Wildlife Fund (WWF), aim to ensure that by 2025, all plastic packaging in the U.S. market is reusable, recyclable, or compostable, with a mandate for at least 30% recycled or responsibly sourced biobased content. This goal underscores the necessity of collaborative and individual company efforts to meet these sustainability benchmarks. Similarly, in the UK, a pivotal step has been taken with the introduction of a plastic packaging tax from April 2022. This tax imposes a levy of £210.82 per ton on plastic packaging containing less than 30% recycled plastic, applicable to both domestically produced and imported packaging. This measure, targeting packaging predominantly plastic by weight, aims to economically incentivize the use of recycled materials, thereby fostering a greater demand for such materials. It effectively encourages recycling and diverts plastic waste from landfill, incineration, and export, aligning with global efforts to enhance packaging sustainability.

2. Resource Scarcity and Cost Savings: The dwindling availability and rising cost of natural resources make recycled materials an increasingly economical choice. PCR materials often prove to be more budget-friendly than virgin counterparts, particularly in a long-term perspective.

3. Corporate Social Responsibility (CSR): Companies are more aware than ever of their role in environmental stewardship. Utilizing PCR materials is a practical expression of this commitment, enhancing a company's CSR profile.

4. Supply Chain Sustainability: Incorporating PCR materials bolsters the sustainability of a company's supply chain, a critical aspect in shaping business strategies and brand reputation.

In essence, the adoption of post-consumer recycled (PCR) poly materials is fueled by a mix of environmental awareness, adherence to regulatory standards, market trends, economic benefits, and commitments to corporate social responsibility. As the recycling sector evolves with better technology and heightened awareness, the prevalence of PCR materials in various industries is expected to rise. This trend underscores the vital role of post-consumer recycling in forging a sustainable future. ZERUST® is at the forefront of this movement, integrating PCR technology into our VCI polymer packaging solutions. By opting for ZERUST® products, companies not only safeguard their metal assets but also contribute to reducing their ecological footprint, actively participating in the global pursuit of a more sustainable and accountable future.



ZERUST® POST-CONSUMER RECYCLED VCI PACKAGING

ZERUST® ICT®510-PCR30 PCR VCI FILM

ICT®510-PCR30 VCI Film is a proven ZERUST® Vapor Corrosion Inhibiting (VCI) film with 30% post-consumer recycled (PCR) polyethylene, providing sustainable and versatile protection against corrosion damage for metals in shipping and storage. Post-consumer recycling is a process that revolves around the collection, processing (sorting, washing, grinding, extruding), and reuse of materials and products that have been used by consumers and then discarded. This approach is vital for reducing waste, conserving resources, and mitigating the environmental impact of traditional disposal methods like landfills and incineration. Use ZERUST® ICT®510-PCR30 VCI Film to protect metal components and assemblies, machined and cast parts, and more for years[†]. For additional protection in challenging environments, ZERUST® VCI Film may be used with ZERUST® corrosion inhibitor liquid RPs and VCI diffuser products. ICT®510-PCR30 VCI Film can be made into VCI bags, gusset liners, tote covers, and more for the ideal protective packaging solution.



ICT®510-PCR30 VCI Sheeting



ICT®510-PCR30 VCI Gusset Liner



ICT®510-PCR30 VCI Tubing

Typical Properties

- Appearance: Typical colors are yellow, blue, or green. Additional colors are available upon request. Subject to order minimums.
- Protected metal types: Available in ferrous and multimetal protection formulations.

Property	Direction (Machine or Transverse)	ICT®510-PCR30 VCI Film*	ASTM Test Method
Film Thickness	-	4 mil (102 µm)	D-6988
Dart Impact Resistance	-	300 g	D-1709
Elmendorf Tear Strength	MD	1100.8 gf	D-1922
	TD	668.8 gf	
Tensile Strength at Break	MD	21.0 MPa (3045 psi)	D-882
	TD	20.1 MPa (2917 psi)	
Elongation at Break	MD	560 %	D-882
	TD	610 %	
Vapor Inhibiting Ability (VIA)	-	Pass	NACE TM0208

* Typical values, not meant to be a specification.

ZERUST® POST-CONSUMER RECYCLING VCI CASE STUDY



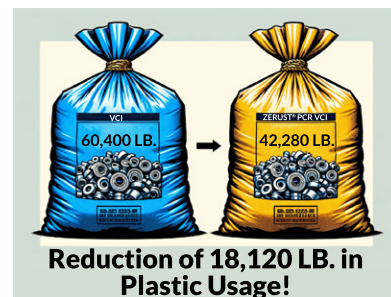
In our journey towards sustainability, we encountered a leading bearing manufacturer grappling with a significant environmental dilemma. They had been using 60,400 LB. of traditional Poly VCI Packaging to shield their bearings from corrosion but were deeply committed to finding a more sustainable solution that would lessen their impact on the environment without sacrificing corrosion protection quality. This quest for an eco-friendlier alternative brought them to us, ZERUST®, a leader in corrosion prevention solutions that recognizes the importance of environmental responsibility.

Sustainable Solution

We embraced the challenge with our innovative ICT®510-PCR30 film, a pioneering sustainable VCI packaging solution that integrates 30% post-consumer recycled material. This strategic move allowed the bearing manufacturer to not only sustain our renowned standard of zero rust on their products but also achieve remarkable strides in environmental conservation. By transitioning to this sustainable packaging option, we facilitated a significant reduction of 18,120 LB. in plastic usage for the bearing manufacturer compared to the traditional Poly VCI Packaging methods they had previously employed.

Results

The outcome of this initiative was profound. The manufacturer continued to enjoy the unparalleled ZERUST® difference in corrosion protection while simultaneously benefiting from substantial cost savings, conservation of organic resources, and a marked reduction in waste destined for landfills. This case is a testament to our commitment at ZERUST® to providing superior corrosion protection solutions that prioritize environmental responsibility, setting a new benchmark for sustainability in industrial packaging.



Circular Economy

ZERUST® is reducing the demand for virgin plastics and promoting the circular economy, actively contributing to a more sustainable and responsible future. By choosing ZERUST® products, businesses not only protect their metal assets and reduce their environmental footprint but also join the global effort towards sustainability. Furthermore, ZERUST® offers a unique opportunity for selected customers to recycle their used VCI products. This initiative enables businesses to further reduce their carbon footprint, potentially achieving a zero carbon footprint with the use of ZERUST® VCI bags. Embrace ZERUST® solutions to make a significant impact on your environmental goals.

Global Support

Algeria	Denmark	Mexico	Sri Lanka
Angola	Ecuador	Monaco	Sweden
Argentina	Estonia	Morocco	Switzerland
Australia	Finland	Nepal	Taiwan
Austria	France	Netherlands	Thailand
Bangladesh	Gabon	Nigeria	Tunisia
Belarus	Germany	Norway	Turkey
Belgium	Hungary	Peru	Ukraine
Bhutan	India	Philippines	United Arab
Bolivia	Indonesia	Poland	Emirates and
Brazil	Ireland	Portugal	MENA
Canada	Italy	Republic of	(Middle East &
Chile	Japan	Congo	North Africa)
China	Kazakhstan	Romania	United Kingdom
Colombia	Korea	Singapore	United States
Czech Republic	Latvia	Slovak Republic	Uruguay
Democratic	Lithuania	Slovenia	Vietnam
Republic of the	Luxembourg	South Africa	
Congo	Malaysia	Spain	

Visit www.zerust.com for more information!

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† DECLARATION

Corrosion protection claims are based on Northern Technologies International Corporation (NTIC) internal laboratory testing performed under controlled parameters on contaminate-free substrates. Real-world application corrosion protection duration on different substrates will vary and depends on factors such as, but not limited to, the application or use, environmental / storage conditions, surface cleanliness, type of substrates, and coating thickness (where applicable). The use of the term "Up to" in reference to time is defined as any time duration from zero up to a specified time frame, but in no event beyond the specified time frame. The use of the term "for years" is based on NTIC's experience with its products but is in no way guaranteed. The use of the term "Up to" in reference to volume is defined as any volume from zero up to a specified volume but in no event beyond the specified volume of protection. It is the customer's / user's obligation to evaluate product performance, corrosion protection duration, safety, and suitability for intended use within the scope advised in the data sheet and to comply with all applicable laws and regulations. **LIMITED WARRANTY/DISCLAIMER** Warranty is limited to the replacement of a product that fails to meet specifications. For full warranty and disclaimer information, visit www.zerust.com/warranty.