InterfaceFLOR and PVC

Interface is known throughout the world for its commitment to environmental responsibility and sustainability. We are often asked about our decision to include PVC in our carpet tile backing, and we take customer and community questions about the health and safety of building materials very seriously. We know PVC, in particular, is an important issue to architects, designers, building owners and other stakeholders who want to make informed decisions about materials safety, both for building occupants and for the environment. To answer your questions about our use of PVC, we have prepared this position paper describing our position on PVC, and in particular, on recycled PVC.

What is PVC?

PVC, or polyvinyl chloride, often called vinyl, is a common building material because it is durable, non-corroding, and flame-retardant. There are billions of pounds of PVC in existence. For many years it has been, and continues to be, a very useful material for countless building applications—including piping, roofing, wall coverings, and flooring. PVC is ubiquitous in our society.

PVC is used in InterfaceFLOR® products as a small component in our GlasBac® and GlasBacRE® carpet tile backing. (PVC comprises less than one-fifth of our backing composite, by weight.) Since 1973, GlasBac has provided the foundation for the high performance characteristics of InterfaceFLOR modular carpet. PVC's unique properties provide our products with superior dimensional stability, and contribute to easier installation and removal as compared with alternative materials. Our GlasBac and GlasBacRE backings are long lasting and recyclable.

Interface chose to include PVC for its performance aspects in 1973 – and we have not found a better performing substitute. We continue to include PVC not only because of the product performance benefits, but also its reduced environmental footprint compared with viable alternatives.

What are the issues associated with PVC?

Some people are concerned that PVC may be bad for human health: 1) because of historical issues associated with PVC production and disposal, and 2) because it is often compounded with plasticizers or heavy metal stabilizers. It is critical to note that PVC is stable in its use phase and does not offgas dioxins or any other hazardous chemicals. Additionally, PVC is not listed as a toxic chemical, carcinogen, or hazardous substance on scientifically-reviewed chemical lists, like the National Toxicology Program list.[1] The potential for human health exposure occurs at two points in the life cycle of PVC, to workers in the production of vinyl chloride monomer (before it becomes a polymer) and at its end-of-life, if it is incinerated with insufficient oxygen to achieve efficient, complete combustion (as in a backyard trash fire). The current scientific research available indicates that the relationship between PVC production and these concerns is low, and that the specific plasticizer used by Interface does not pose a risk to human health or the environment.

Interface continually reviews scientific evidence related to PVC and plasticizers and their effect on human health and the environment. We are confident that our use of PVC and our specific plasticizer is safe for our employees and our customers.

Production of PVC

In response to regulatory action in the early 1970's, the PVC production process is now carefully monitored to ensure worker safety.[2] The federal government considers the health threat to workers to have been "virtually eliminated" following regulatory action that controls the production of vinyl chloride monomer at a controlled, safe exposure level.[3]

According to the EPA, vinyl chloride manufacturing results in far less dioxin pollution than from heavy duty diesel trucks, and contributes to less than 3% of total dioxin pollution.[4] The same EPA study concludes that total dioxin releases have been reduced by more than 90%,[5] even while PVC production has tripled.

End-of-life treatment of PVC

All chlorinated substances such as paper, wood, and PVC-containing pipe or flooring, may contribute to the formation of small concentrations of dioxin if they are involved in a fire with insufficient oxygen to achieve efficient, complete combustion (as in a landfill or backyard trash fire).[6] Because these are rare events in the ordinary life cycle of carpet tile, and because we consume less than one-fifth of one-tenth of one percent of the PVC consumed in the U.S. annually,[7] we believe the contribution to these hazards from the PVC content of our products is negligible, and that the environmental trade-offs incurred with alternative product substitutions actually increase environmental impact and are not warranted.

Moreover, Interface is strongly committed to *avoiding* any end-of-life disposal scenarios by reclaiming any and all used carpet, especially carpet with PVC content. We want these products back so that we can recycle old carpet into new carpet with the newest, low energy recycling processes. We are reclaiming and recycling our competitors' products too – reducing the risk of end-of-life burning for their PVC-containing products as well as our own. Using recycled PVC keeps this material out of the rare end-of-life scenarios where uncontrolled burning might occur.

Plasticizers and Stabilizers

Phthalate plasticizers add the attribute of flexibility for many PVC products. At Interface, we use di-isononyl phthalate (DINP). In 2006, after an extensive life cycle study, the European Union found no human health risk to workers, consumers, or humans exposed via the environment from DINP used as a PVC plasticizer.[8] The EU study also found no risk to the atmosphere, aquatic ecosystem or terrestrial ecosystem from such use of DINP.[9]

As to PVC stabilizers, Interface does not use heavy metals in its GlasBac or GlasBacRE backing.

Why is Interface using PVC?

Until we can reclaim enough used carpet and other recyclable materials to completely displace virgin raw materials, we must rely on commercially viable alternatives, like virgin PVC, that offer high performance and a reduced environmental footprint. Through our combined R&D, robust product testing, and market research and experience, we have not found an alternative material that provides the same high performance as PVC for carpet tile backing. We are confident in the current science that PVC and DINP are safe as used in our products.

With our extensive history in sustainability, we also know that performance and durability are critical aspects of sustainability. Anytime a product must be replaced prematurely, the entire life cycle of environmental impacts are incurred prematurely. We will not launch an inferior or short-lived 'green' product into the marketplace because durability and performance are key aspects of sustainability.

More importantly, Interface has developed the ability to recycle our GlasBac material efficiently and keep this valuable raw material in a closed loop cycle. We are proponents of The Natural Step framework and the corresponding philosophy that *no material is inherently sustainable or unsustainable– only the management of materials can be deemed sustainable or unsustainable.*[10] In line with the continuing evolution in understanding of other materials such as wood, bamboo and refrigerants, we believe that *how* a material is handled, processed, and used represents the main factor in its environmental and health footprint. We are committed to managing our use of PVC to be sustainable, by reducing our dependence on natural resources and promoting closed loop production cycles.

Environmental footprint of PVC

PVC is a petroleum-based product and is classified as a plastic. Most carpet tile backing in the market utilizes virgin petroleum-based plastic materials. As an industry, our continued dependence on virgin petroleum is not sustainable. How should we answer the following questions raised by this dependence, specifically with respect to PVC? For example:

- What should we do about the billions of pounds of PVC products that are already circulating in society?
- Should our society bury or incinerate these PVC- based items and lose these highly useful raw materials?
- Should a manufacturer spend the time, energy, and natural resources needed to make new virgin plastics when tons of perfectly usable PVC are being sent off to landfills or incinerators every day?

At Interface, we have considered these issues and decided to recycle the PVC in used carpet tile (ours as well as our competitors') to perpetuate its usefulness and to avoid environmental costs associated with creation and disposal of virgin materials. We believe that the closed loop management of our GlasBac and GlasBacRE products provides the best opportunity to reduce and potentially eliminate this dependency on virgin materials.

Based on what we have learned in examining these larger questions, we maintain there is a big difference between virgin PVC with no end-of-life plan and PVC that is reclaimed and recycled into new products.

<u>Switching to new virgin material prevents closing the loop today</u>

Interface has investigated the use of other plastics for carpet backing, and none meet our standards for product or environmental performance. Furthermore, if we did switch to a different material, it would be ten years, on average, before that new material would come off of the floor and enter the recycling stream. In the meantime, we would be squandering embodied energy and using tomorrow's petroleum as a raw material to make a new virgin plastic product – while tons of existing materials, like vinyl, would be headed to landfills. The supply chain and production of all virgin plastics have damaging environmental impacts and at Interface, our efforts are focused on using less new materials and energy to make our products. We recycle and reuse existing materials, keeping products in a dynamic, closed production loop.

Therefore, instead of choosing to use yet another virgin plastic (as many other manufacturers have done), we are following a path that closes the production loop *today* at Interface with GlasBacRE carpet backing by using post-consumer recycled content from reclaimed carpet. While other manufacturers switch to new virgin plastics and abandon the end-of-life management of their PVC-containing products, we are recycling post-consumer PVC-containing carpet today. In fact, we have reclaimed and recycled over 600,000 pounds of our competitors' products in 2007 alone. We are giving new life to old carpet that is on the floor today, and conserving natural resources in the process.

<u>The benefits of recycled PVC</u>

Interface developed a low-energy, low-waste process to recycle reclaimed PVC into new carpet backing. In our case, there are clear environmental advantages to using recycled PVC, specifically global warming and embodied energy impacts. Virgin plastics and PVC are made in energy-intensive processes. Our recycled GlasBacRE captures and salvages this "embodied energy" and requires much less "new" energy to return it to a new product life cycle. Consequently, the embodied energy of recycled GlasBacRE products is much less than those made from virgin plastics. This saves energy throughout the supply chain, and equates directly to reduced greenhouse gas emissions, assuming the energy sources were fossil fuels.

The LCA of PVC

Our Mission Zero goal requires us to measure our journey's progress in a valid and scientific way. Interface uses Life Cycle Assessment ("LCA") to assess the ultimate environmental impact of our materials and products, and we use LCA to guide our product decisions. LCA methodology provides a standardized, transparent framework to understand multiple environmental impacts (ranging from global warming to ozone depletion to embodied energy) resulting from the full life cycle of a product (from raw material extraction through end of life or use). In addition to LCA, we screen materials based on toxicity and durability. By using data to fully understand and measure the entire environmental impact of materials, we make better choices.

When we perform this rigorous, multidimensional LCA on GlasBac backing with virgin PVC and compare these results with viable alternative backing materials, GlasBac backing performs better environmentally, with lower life cycle environmental impacts. When we perform this analysis on recycled GlasBacRE backing, the answer is clear that recycled GlasBacRE carpet tile backing is an even better environmental choice.

PVC and LEED® certification

In February 2007, a Technical and Scientific Advisory Committee under the U.S. Green Building Council (USGBC) issued its final report on the technical and scientific basis for a PVC-related credit within the LEED® Green Building Rating System™. After examining more than 2,500 documents and multiple building materials, this committee concluded that "no single material shows up as the best across all the human health and environmental impact categories, nor as the worst." [11] In other words, the USGBC's PVC report "tells us there is no scientific justification for singling out PVC and awarding a point for avoiding it through the LEED rating system." [12, 13]

Additionally, in December 2007, the USGBC announced that LEED projects can now earn an "Innovation in Design" credit by using carpet certified to the Sustainable Carpet Assessment Standard ("SCAS"). This standard assesses products on a number of criteria throughout the global supply chain, such as *use of safe and healthy materials*; material reuse, recycling, energy efficiency, renewable energy, and water reuse; and social equity. [14] InterfaceFLOR's carpet tile products made with GlasBacRE backing have earned the Platinum certification, the highest level, and styles using GlasBac and NexStep have earned Gold certification.

Conclusion

This thought process and analysis leads us to an inevitable conclusion: recycled PVC is the best carpet tile backing material available today, and the material that can best help us reach our Mission Zero goal of zero environmental impact. Interface has determined this through a hard look at the hard science. Interface has analyzed the environmental impacts, the human health factors, and product performance characteristics related to PVC and other potential backing materials, and recycled PVC is clearly the best choice from among those currently available.

Therefore, through our ReEntry™ carpet reclamation program, Interface is intensifying its focus on retrieving PVC containing carpet tiles made by Interface and our competitors – giving these materials life after life as a substitute for virgin raw materials. ReEntry™ offers every customer a reclamation option for their used carpet. The high amount of *post-consumer* recycled content in our products from reclaimed carpet proves the success of our ReEntry program and validates our progress towards zero environmental footprint.

Interface's GlasBacRE is a solution that exists today to close the loop on PVC and turn post-consumer carpet backing into a new high performing carpet backing without sacrificing performance, quality, or environmental impact. Our closed loop management of PVC corresponds to The Natural Step's approach to materials – managing the entire life cycle of materials in a sustainable way.

Endnotes

[1] PVC in its use phase is not listed as a toxic chemical, carcinogen, potential carcinogen, or hazardous substance on scientifically-reviewed chemical lists, including:

- NTP - National Toxicology Program. Available at (last accessed on November 6, 2007) http://ntp.niehs.nih.gov/index.cfm?objectid=72016262-BDB7-CEBA-FA60E922B18C2540
- IARC - Int'l Agency for Research on Cancer. Available at (last accessed on November 6, 2007) http://www.iarc.fr/
- ACGIH - American Conference of Governmental Industrial Hygenists. Available at (last accessed on November 6, 2007) http://www.acgih.org/home.htm
- California Proposition 65 List of Hazardous Substances. Available at (last accessed on November 6, 2007) http://www.oehha.ca.gov/prop65/prop65_list/Newlist.html#list
- California Occupational Health and Safety Adminstration Hazardous Substance List. Available at (last accessed on November 6, 2007) http://www.dir.ca.gov/title8/339.html
- UNEP Stockholm Convention on Persistant Organic Pollutants. Available at (last accessed on November 6, 2007) http://www.chem.unep.ch/pops/

[2] Occupational Safety and Health Standards (Standards - 29 CFR), Part Number: 1910, Part Title: Occupational Safety and Health Standards, Subpart Title: Toxic and Hazardous Substances, Standard Number: 1910.1017, Title: Vinyl chloride. Available at (last accessed on October 3, 2007): http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10021

[3] Epidemiologic Notes and Reports Angiosarcoma of the Liver Among Polyvinyl Chloride Workers – Kentucky, Centers for Disease Control and Prevention Web site. 1997. Available at (last accessed on October 3, 2007): http://www.cdc.gov/mmwr/preview/mmwrhtml/00046136.htm

[4] The EPA considers both ethylene dichloride production and vinyl chloride production for these data. See Table ES-2, page xlvi (Abstract) in "U.S. EPA. An Inventory of Sources and Environmental Releases of Dioxin-Like Compounds in the United States for the Years 1987, 1995, and 2000 (EPA/600/P-03/002f, Final Report, November 2006). U.S. Environmental Protection Agency, Washington, DC, EPA/600/P-03/002F." Available at (last accessed on October 3, 2007):
http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=159286

[5] Ibid, page ii.

[6] Ibid, Chapter 6.

[7] In 2006, InterfaceFLOR used 5,805 metric tons of PVC. Current annual PVC consumption is 33,500,000 metric tons. (Source : Steven Brien, Global Practice Leader, Chlor-alkali & Vinyls, CMAI. Presented at World Vinyl Forum III, September 2007.) Therefore, InterfaceFLOR products are using 0.0173% (less than one-fifth of one-tenth of one percent) of the total PVC in the United States.

[8] Official Journal of the European Union, C 90/4, April 13, 2006, Part 5. Available at (last accessed on October 22, 2007):
http://eur-lex.europa.eu/LexUriServ/site/en/oj/2006/c_090/c_09020060413en00040028.pdf

[9] Ibid

[10] For additional information on The Natural Step, see http://www.naturalstep.org

[11] See pages 3 and 9 in "Assessment of the Technical Basis for a PVC-Related Materials Credit for LEED", Technical and Scientific Advisory Committee PVC Task Group of the U.S. Green Building Council, February 2007. Available at (last accessed on October 19, 2007):
http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1633

[12] GreenSource Magazine, "Practicing Precaution: The power and limitations of science in the selection of building materials", Alex Wilson, July 2007. Available at (last accessed on October 19, 2007): http://greensource.construction.com/features/0707mag_current.asp

[13] Organizations at both extremes of the PVC debate have cited this meta-study as proof of their position. Interface encourages and participates in the development of new methods of evaluating and developing better performing materials and ongoing research to understand the impacts of the handling and processing of materials. We do not support blanket declarations of the safety or danger of materials without understanding the life cycle impacts of their handling.

[14] USGBC Members may access this Innovation in Design Credit Interpretation Request dated 12/18/2007 on the USGBC website. Available at (last accessed on January 3, 2008):
http://www.usgbc.org/LEED/Credit/CIRDetails.aspx?RequirementID=639