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history



Vinyl Ester ducting, staged for shipment to Intel

## ***Corrosive Waste Vapors Push Intel Toward Vinyl Ester Ducting***

*Fire Retardant  
Corrosion Resistant*

### **PROBLEM**

Back in the 1980s Intel Corporation, and all other semiconductor facilities, had tough choices to make. They were adding chip capacity at a rapid pace, which meant they needed to look at corrosion resistant ducting to vent the waste air stream from their etching operations. The waste stream contained a number of corrosive agents, including:

- (A) Strong acids such as hydrochloric (HCl), sulfuric (H<sub>2</sub>SO<sub>4</sub>), nitric (HNO<sub>3</sub>) and hydrobromic (HBr).
- (B) Caustic and ammonia (NaOH and NH<sub>3</sub>)
- (C) Numerous corrosive chemicals, including chlorine gas (Cl<sub>2</sub>), hydrofluoric acid (HF) and others.

They first looked at options which involved either coated stainless steel or hybrid resin systems, but these were fraught with issues.

The first involved stainless steel with a Teflon<sup>®</sup> coating. While this sounded good, the case history for this construction showed that the corrosive agents had a tendency to permeate through the Teflon<sup>®</sup> and ultimately corrode the stainless steel. Also, there were many bolted joints in this system that ultimately were a risk to start leaking. The fact was that this option was just not very robust, and had trouble getting accepted.



Intel Ducting, 90° elbow with manifold

The second option involved a construction using phenolic resin for the structural layer, with a thin vinyl ester based liner on the inside. This system had some distinct advantages, primarily in the area of fire resistance, but also some came with several weaknesses. Phenolics don't typically fare well in wet environments, and therefore couldn't be used outside unless a protective coating was applied. The corrosion resistance was also a bit suspect, as the vinyl ester liner was normally quite thin. This system had serious drawbacks as well with little history of longevity. Therefore, Intel decided not to specify it.

## SOLUTION

Intel finally decided that the best solution was an all vinyl ester duct. The system would be sprinklered to protect against fire, with vinyl ester providing the corrosion resistance necessary for the process. And then along came Corrosion Companies Inc.'s Senior Vice President Chris Kellogg, offering their trademarked DuraDuct® construction, made with CoREZYN® VE8440 from Interplastic Corporation. This is a brominated, Bisphenol A based vinyl ester resin, which provides both outstanding fire retardance and corrosion resistance. It also

stands up well to wet environments, which was a major weakness of the phenolic resin system. And because it was used throughout the laminate structure, the thick vinyl ester resin barrier would stand up to the harsh, corrosive environment from etching for years to come. Corrosion Companies fabricated the ductwork system using the CoREZYN® VE8440. Both their professionalism and quality control practices resulted in an outstanding HVAC system for the new Intel chip facilities. This duct system is still in use today (as of June 2012), over 15 years later, with little or no corrosion attack. It is still the solution of choice for sprinklered HVAC systems in the semiconductor industry.

## BENEFIT

The initial cost of the pure vinyl ester solution was lower than the SST/Teflon® system, and comparable to the phenolic/vinyl ester option. And 15+ years after it was first installed, the ducting is still in service as of June 2012, far exceeding expectations! According to Chris Kellogg, this system requires very low levels of ongoing maintenance when compared to other options. The simple fact is that DuraDuct® vinyl ester duct systems made with Interplastic's CoREZYN® VE8440 have provided superior performance and return on investment to the semiconductor industry.



For additional information about the fabrication of corrosion resistant ducting, or the materials used, please contact:

Chris Kellogg  
Corrosion Companies Inc. - [chris@ccifrp.com](mailto:chris@ccifrp.com)  
or  
Peter Surmak  
Interplastic Corporation - [psurmak@interplastic.com](mailto:psurmak@interplastic.com)



1225 Willow Lake Blvd., St. Paul, MN 55110-5145  
800.736.5497 • 651.481.6860 • Fax: 651.481.9836  
[www.interplastic.com](http://www.interplastic.com)

*Exceeding  
Expectations*