



CORROSION INTERCEPT



By Appointment
to Her Majesty Queen Elizabeth II
Suppliers of Conservation Storage,
Equipment and Display Products
Conservation By Design Limited Bedford

© EMI 2000 **Technical Bulletin 36 Static Intercept Protection of Fibre Optics and Optical Systems**

**Developed by Lucent Bell Labs to fight the dual problem of Corrosion and Static Electricity
Designed to Save you Money from expensive losses due to ESD and/or Corrosion**

Static Intercept is a revolutionary technology which uses semi-conductor technology to transform standard plastics into semi-conductor devices capable of protecting even the most sensitive electronic device from both ESD and Corrosion damage. Static Intercept is the 'State of the Art' technology for the protection of static and corrosion sensitive materials. Intercept was developed by Lucent Technologies Bell Labs to solve the problems the electronics industry was experiencing with static and corrosion damage. Intercept is unique in its effective combination of protection.

Optical Systems – Unique Concerns:

Optical Systems pose a new dilemma for packaging and materials handling. Whereas the fiber optic cable has limited ESD concerns, the materials go into ESD safe areas, in addition optical systems often can have extremely high sensitivity to even minute amount of ESD charge. Traditional ways to protect electronics often do not meet the stringent requirements for cleanliness and non-contamination required for these sensitive items.

Testing was done at Bell Labs looking at contamination of fiber optics. It was discovered that fiber optics, being insulative, can and do easily carry charges. When a charged optical fiber was placed in a conductive bag there was sufficient charge on the fiber to electrically pull carbon particles out of the conductive carbon black bag. The same experiment was run utilizing an Intercept bag – no particles were observed on the optics.

Table 1 Packaging Commercially Available		
Material	Advantages	Disadvantages
(1) Conductive Carbon	Low outgassing Permanent ESD protection Can be low contamination	Opaque Sloughs carbon particles Fiber can pull carbon from plastic Conductive – can cause CDM failures
(2) Anti-static Poly	Cheap Can be made clean	Outgasses Short effective shelf life
(3) Static Intercept	No outgassing / no NVR	Opaque Permanently static dissipative

Another issue is ESD, and at what point does the material begin to dissipate a charge – this is also referred to as the activation threshold point. All ESD materials have an activation threshold, or the voltage at which the material allows electricity to flow. The activation threshold is critical for very sensitive devices, because below the activation threshold an ESD material is essentially insulative. Standard test meters often start measuring at 100 volts, substantially above the level where sensitive electronics are damaged or destroyed. Other meters test at 10 volts.

Table 2 Activation Threshold Values	
Material	Activation Threshold Value
Anti-Static Plastic Conductive Plastic Static Intercept	Greater than 35 volts approximately 8-12 volts 0.8 volts

CONSERVATION BY DESIGN LIMITED

Timecare Works • 5 Singer Way • Kempston • Bedford MK42 7AW • Tel: +44 (0)1234 853 555 Fax: +44 (0)1234 852 334
E-MAIL: info@conservation-by-design.co.uk • WEB SITE: <http://www.conservation-by-design.co.uk>



CORROSION INTERCEPT



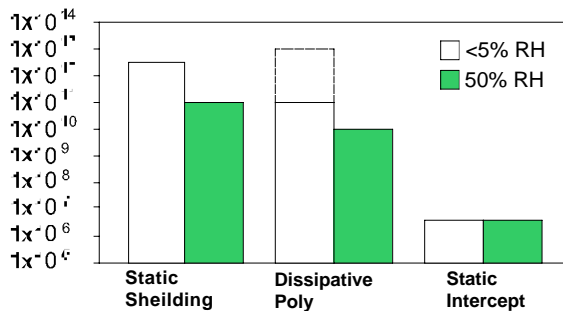
© EMI 2000 **Technical Bulletin 36 Static Intercept Protection of Fibre Optics and Optical Systems**

Cleanroom issues also need to be taken into consideration in dealing with optics and optical systems. Test data has been compiled on Static Intercept and is listed below. Also it should be noted that Static Intercept can be cleaned and packaged in a class 10 cleanroom, as well as for highly critical applications the film can also be manufactured completely within a clean class 100 cleanroom.

Chromatography Test Results Data in Parts Per Billion (ppb)					
Ions	Limit (ppb)	Static Intercept	Anti-Static Foam	Lint Free Paper	HDPE (Tyvek)
Flouride (F)	36	0.4768	< 160	8,020	< 160
Chloride (Cl)	36	1.3256	19,250	< 530	< 330
Bromide (Br)	36	0.0000	< 30	< 20	< 30
Potassium (K)	109	0.0000	3,700	211,200	1
Sulphate (SO4)	72	0.8216	< 320	< 400	< 330
Nitrate (NO3)	72	0.0000			
Phosphate (PO4)	145	0.0000			

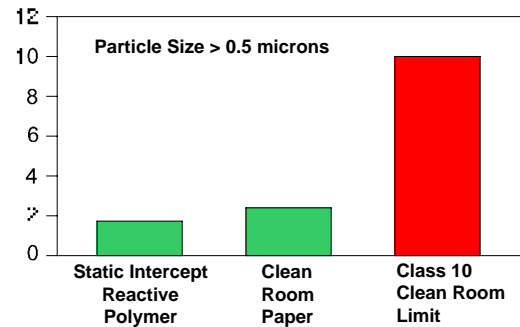
Particle Shedding Helmke Drum Test

Comparison of Surface Resistivity High and Low Relative Humidity



Existing Technologies rely on atmospheric moisture to function, but Static Intercept's surface resistivity is unaffected by high or low relative humidity

Particles /Sq. In./Cu. FL



The particle counts of Static Intercept are substantially below those limits set for Class 10 clean rooms

So, in short, Static Intercept is an ideal material for protecting sensitive fiber optics and optical systems.

Alternate Systems for Corrosion and Oxidation Protection:

Other systems do exist that provide corrosion protection, however these systems depend on actively coating the surface of the material that they are protecting with a thin layer of protective oil. This class of materials are commonly referred to as "Volatile Corrosion Inhibitors", or "VCI's". VCI plastics are very unstable because of the heat involved in the manufacturing process. The oil is thermally unstable at high temperatures, so much of the "VCI protection" evaporates in the manufacturing process, limiting its protective lifetime. Some VCI manufacturers will lead companies to believe that VCI's leave no contamination behind, that they completely evaporate off of the surface of the metal being protected. If they can evaporate so easily and quickly off of the surface of a metal at room temperature, how can they possibly have enough stability to go through an extrusion process at close to 400°F, and then survive transportation and storage conditions.

However, the three most serious drawbacks to VCI's in general, and Silver Saver in particular, are:

- (1) Contamination of the metal surface. VCI's only work when they actively coat the surface of the metal being protected. This oil coating contaminates the surface of the metal and can, under high humidity, high temperature conditions contribute to surface staining (corrosion).
- (2) Limited shelf life and useful life. Since VCI's are made from volatile oils, that function by evaporating from the surface of the paper, they do have a limited shelf life. This limited shelf life is shortened by storage conditions in hot or humid environments (or by shipment in trucks in the warm or hot times of the year). The effective useful life of Silver Saver is about 6 months from the date of manufacture. VCI's also do not let you know when they have stopped being effective, they just stop working.

CONSERVATION BY DESIGN LIMITED

Timecare Works • 5 Singer Way • Kempston • Bedford MK42 7AW • Tel: +44 (0)1234 853 555 Fax: +44 (0)1234 852 334
E-MAIL: info@conservation-by-design.co.uk • WEB SITE: http://www.conservation-by-design.co.uk



CORROSION INTERCEPT



© EMI 2000 **Technical Bulletin 36 Static Intercept Protection of Fibre Optics and Optical Systems**

- (3) Causing intermittent electronic failures. Bell Labs discovered that the use of VCI's on populated boards caused intermittent failures in their electronics due to the contamination left behind. In addition to the contamination on the surface of the electronics the sticky nature of VCI's attracted dust which, when hydrated, caused electrical shorts. Experiments have confirmed that boards or systems when placed inside a VCI bag and then exposed to normal levels of dust or particles in the environment will experience failures at humidity levels above 60% RH. No failures were seen in the test when the boards were placed in Intercept bags.
- (4) US Military ban. The US Military in DLAM 4145.2, Volume 1/TM 38-230-1 / AFP 71-15 Volume 1 / NAVSUP Publication 502, REV. Volume 1/MCO P4030.31C states:
VCI Materials must not be used to protect any assemblies containing optical systems

VCI's shelf life is caused by evaporation of the oil from the surface of the paper. Silver Saver, as well as other VCI materials, should be kept in sealed containers to prolong their life. Intercept on the other hand has a very long useful life, well beyond 10 years in most cases. For the various reasons above, VCI's are not a good choice for protecting optical systems or fiber optics.

Moisture Barrier Applications:

Static Intercept is in itself a very good moisture barrier material. However, when an absolute barrier material is needed the Polyproof 2000 bag is the ideal solution. The addition of a foil barrier layer to the Intercept material (the Polyproof 2000 bag) provides protection unsurpassed by any product on the market being incorporating the lowest MVTR product on the on the market being incorporating the lowest MVTR product on the market with the active corrosion protection of the Intercept layer.

Static Intercept Forms:

Static Intercept can come in a whole variety of forms including:

- Flat and Zipper Closure Bags
- Film – 3 and 4 mil are standard gauges (2-6 are available) for approved applications
- Cleanroom film – cleaned to class 100
- Export Bags (large bags to replace moisture barrier packaging for shipping)
- Moisture Barrier Bags with Intercept inner liner
- Plastic Corrugate - can be sold as sheets or finished trays or boxes
- Die Cut folders and holders for chips, wafers, and components
- Thermoformable Styrene, Polyethylene, or Polypropylene Sheets
- Thermoformed trays, totes and boxes
- Injection molded trays, totes and boxes
- Intercept Foam Core - new material combining the Intercept Technology with foam

CONSERVATION BY DESIGN LIMITED



CONSERVATION DESIGN CONSERVATION PRODUCTS CONSERVATION CONSULTANCY

To receive information on our other products please tick & Fax

NAME _____

ORGANISATION _____

ADDRESS _____

TEL: _____ FAX: _____

ACID FREE BOXES & ENVELOPES

PHOTOGRAPHIC STORAGE

ACID FREE PAPERS & BOARDS

OXYGEN FREE STORAGE

CONSERVATION SUNDRIES

CONSERVATION EQUIPMENT

WORKSHOP FURNITURE

DRAWER STORAGE & SHELVING

CONSERVATION SHOWCASES

TELEPHONE
+44 (0)1234 853 555

FACSIMILE
+44 (0)1234 852 334

E-MAIL
info@conservation-by-design.co.uk

WEB SITE
http://
www.conservation-by-design.co.uk

CONSERVATION BY DESIGN
TIMECARE WORKS
5 SINGER WAY • KEMPSTON
BEDFORD • MK42 7AW