Cor-Pak® Stretch Film Vs. Competitor's Stretch Film

Background: A competitor's stretch film was submitted for comparison testing with Cortec's Cor-Pak® Stretch Film. It is believed this film was manufactured by ITW. The physical properties of this competitor's film were tested by the manufacturer of Cor-Pak® Stretch Film and compared with results from the Certificate of Analysis of the Cortec Stretch Film.

Purpose: Perform comparative corrosion testing on the competitor film provided and Cor-Pak® Stretch Film.

Methods: FT-IR Spectroscopy

Razor Blade Test

VIA Test

SO_2 Test

Physical Properties Testing (Performed by Cor-Pak® Stretch Film Manufacturing Facility):

- ASTM D-882-91 "Standard Test Method for Tensile Properties of Thin Plastic Sheeting"
- ASTM D-1922-93 "Standard Test Method for Propagation Tear Resistance of Plastic Film and Thin Sheeting by Pendulum Method"
- ASTM D-5458-95 "Standard Test Method for Peel Cling of Stretch Wrap Film"

Materials: Razor Blade Test Kit

VIA Test Kit

SO_2 Test Kit

Paragon 1000 FT-IR, Perkin Elmer

Procedure: The above tests were run according to the standard procedures for each.

***Note**: The SO_2 Test was run using 3 layers of stretch film.*

Results:

	Razor Blade			**SO_2 Test (Grade)**			**VIA Test**
Competitor Film (2.4 mil)	Fail	Fail	Fail	0	0	0	Grade 0

Cor-Pak® Stretch Film (2.2 mil)	Pass	Pass	Pass	4	3	4	Grade 3
Untreated Stretch Film (Control 1.7 mil)	Fail	-----	-----	Fail	----	----	Fail (Severe corrosion)

Note: See attached photos of results.

SO_2 Test Grades (Grade 3 and 4 are passing):

Grade 0 - Extensive corrosion covering 25% or more of panel surface

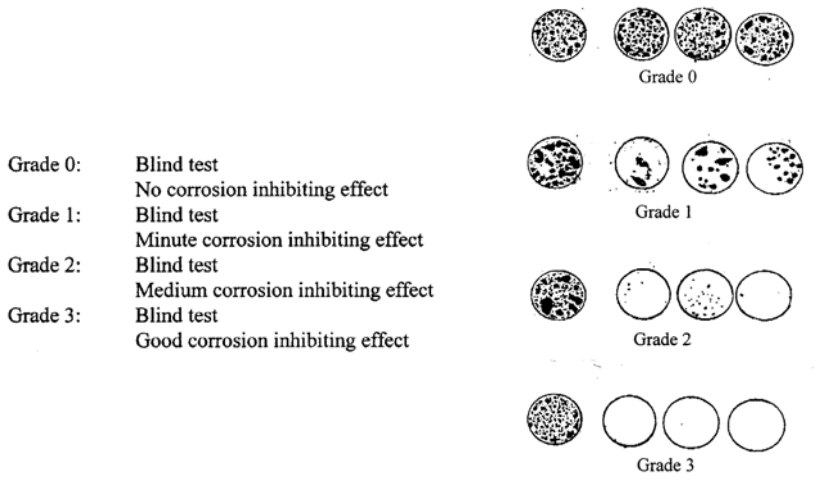
Grade 1 - Moderate corrosion covering 10-25% of panel surface

Grade 2 - Slight corrosion 5-10% of panel surface

Grade 3 - Very slight corrosion 0-5% of panel surface

Grade 4 - No visible corrosion on panel surface

VIA Test Grades



FT-IR Spectroscopy: The competitor film does not appear to contain any corrosion inhibitors. The FT-IR spectra for two films are comparable.

Physical Properties: Comparing the results, the properties tested in the transverse direction are comparable. When testing in the machine direction, significant differences appear in the peel cling strength and the tear strength. The competitor film was found to have a very uniform mil thickness suggesting this film may have been cast extruded. In addition, the tackiness of the two films is significantly different. It is possible a different tackifier and/or resin was used in the construction of the competitor film.

Note: The tackiness of stretch film is directly related to the tear resistance and peel cling performance of

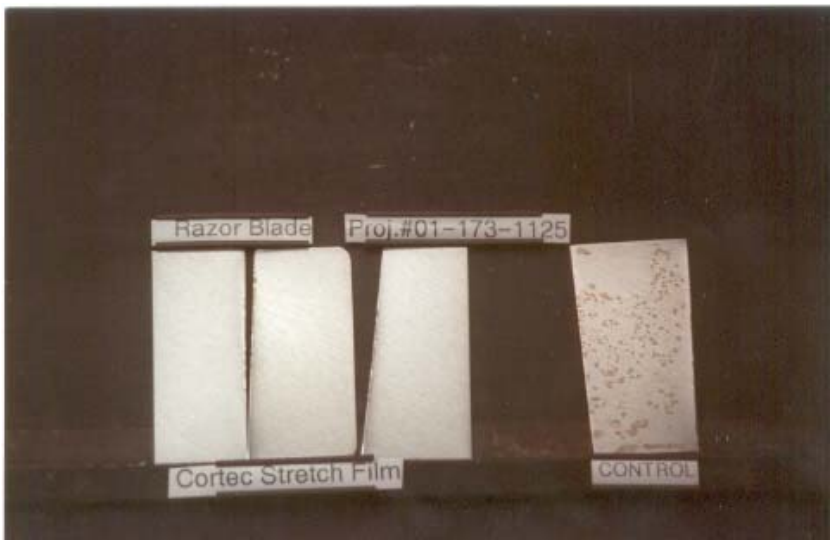
stretch film.

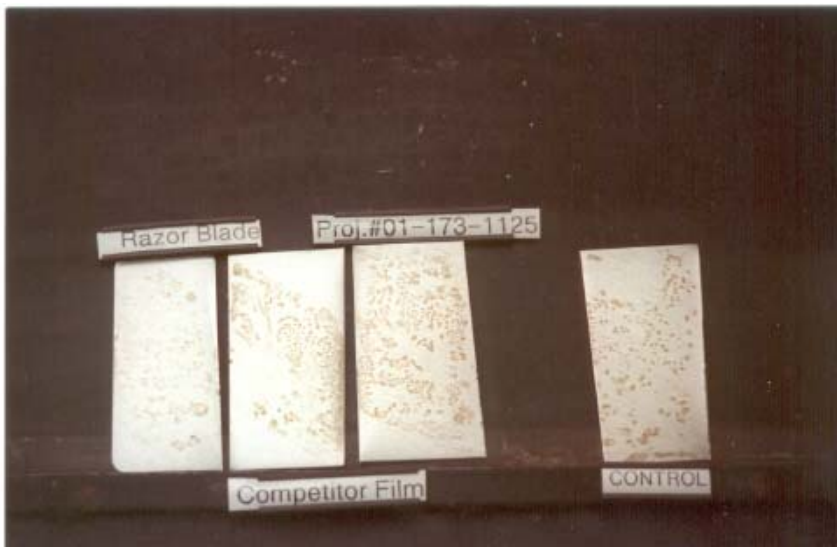
One must be very cautious in the interpretation of these results, as the comparison is not comparing "apples to apples". The manufacture date of the competitor film is not known nor are the environmental conditions the film has been exposed to. Age and temperature are big factors influencing the tack level of these films.

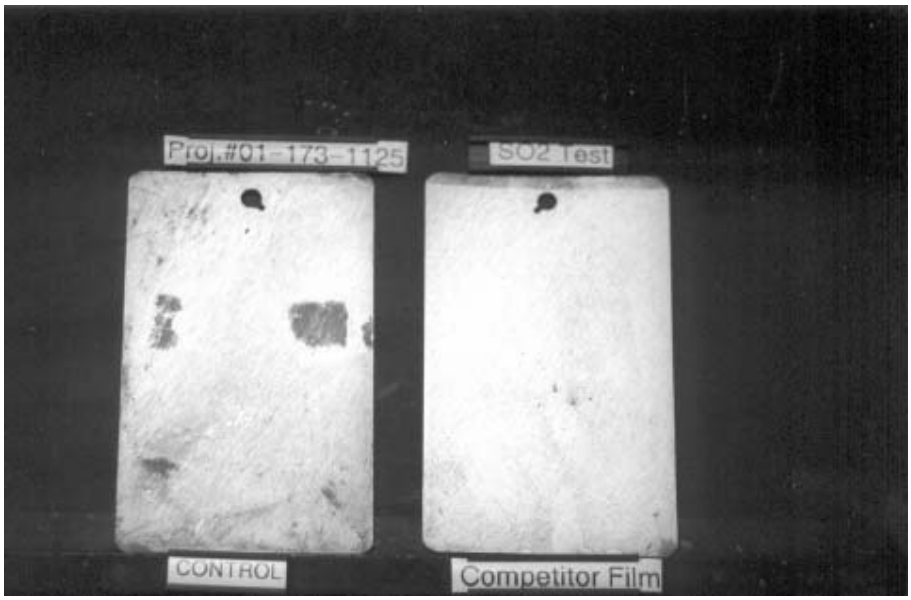
Conclusion: 1. Care must be taken in the interpretation of the Physical Properties. The best test comparison would be two films of the same mil thickness, manufactured around the same time and exposed to similar environments. Also, testing should be performed comparing one application at a time (i.e. same wrapping machine method, etc.)

1. Cor-Pak® Stretch Film provides superior corrosion protection.
2. The competitor stretch film contains very little if any inhibitor.

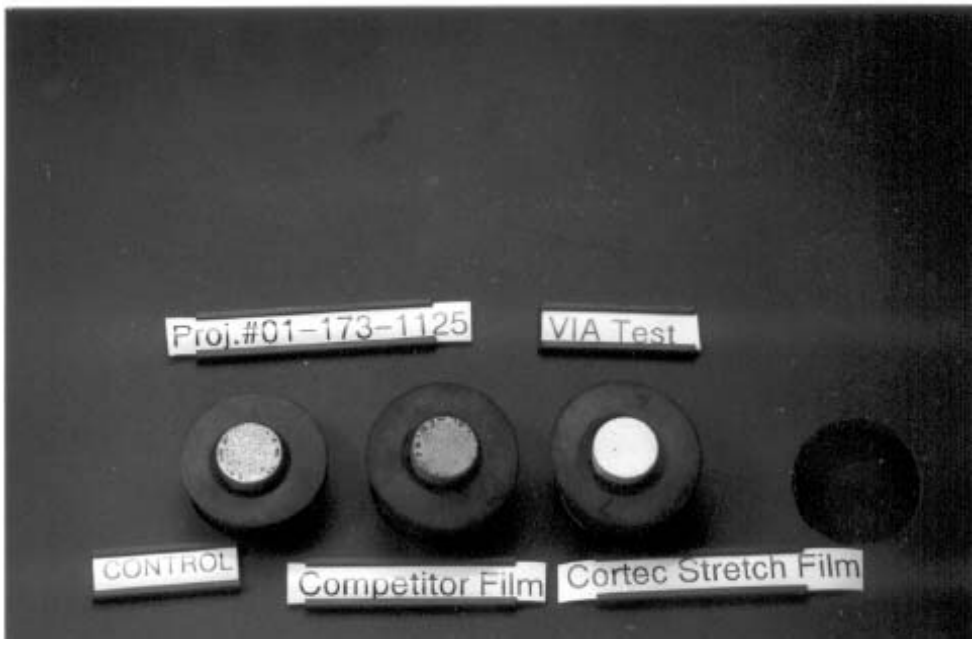
Project #01-173-1125




Razor Blade
Proj.#01-173-1125
Competitor Film
CONTROL


Proj.#01-173-1125
SO2 Test
CONTROL
Competitor Film


Proj.#01-173-1125
SO2 Test
CONTROL
Cortec Stretch Film


Proj.#01-173-1125
VIA Test
CONTROL
Competitor Film
Cortec Stretch Film

SODIUM NITRITE, 5.1, UN1500, PGIII, OXIDIZER/TOXIC

98%-120 MESH Lot No: **NANI-03-171**

RQ: 100(45.4) Net Wt. **50 LBS.**

CAS#: 7632-00-0 RTECS#: RA 1225000

FW: 69.00 MERK INDEX: 9,8407

Emergency Contact: CHEMTREC:1-800-424-9300

CHEMTREC INTERNATIONAL: (703) 527-3887

HEALTH HAZARADS & FIRST AID:
MATERIAL IS DANGEROUS IF INHALED! IMMEDIATELY FLUSH EYES OR SKIN WITH COPIOUS AMOUNT OF WATER, FOR AT LEAST 15 MINUTES IN CASE OF CONTACT EXPOSURE. MATERIAL IS IRRITATING TO THE MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT. EXPOSURE
SYMPTOMS MAY INCLUDE - BURNING SENSATION, COUGHING, WHEEZING, SHORTNESS OF BREATH, HEADACHES, LARYNGITIS, NAUSEA AND VOMITING, DIURESIS, ANEMIA, METHEMOGLOBINEMIA, NEPHRITIS, GASTROENTERITIS AND VASODILATION. IF MATERIAL HAS BEEN INHALED, REMOVE SUBJECT TO FRESH AIR. IF SUBJECT IS NOT BREATHING GIVE ARTIFICIAL RESPIRATION - PREFERABLY MOUTH-TO-MOUTH. IF BREATHING IS DIFFICULT OXYGEN SHOULD BE SUPPLIED. CONTAMINATED CLOTHING SHOULD BE REMOVED AND THOROUGHLY CLEANED BEFORE REUSE. CALL A PHYSICIAN! WASH THOROUGHLY AFTER HANDLING.

INCOMPATIBILITIES: ACIDS, ACID ANHYDRIDES, FUELS, (REDUCING AGENTS). EXPLOSIVE MIXTURES MAY RESULT FROM IMPROPER HANDLING!

PRODUCTS OF DECOMPOSITION: OXIDES OF SODIUM AND NITROGEN.

HANDLING & STORAGE: APPROPRIATE OSHA/MSHA APPROVED RESPIRATOR, CHEMICALLY RESISTANT GLOVES, CHEMICAL GOGGLES AND OTHER APPROPRIATE PROTECTIVE CLOTHING (RUBBER APRON OR OVERWEAR)SHOULD BE WORN. MECHANICAL EXHAUST IS REQUIRED. AVOID CONTACT WITH EYES, SKIN AND CLOTHING. DO NOT BREATHE DUST. AVOID PROLONGED AND REPEATED EXPOSURE. HYGROSCOPIC. KEEP CONTAINERS SEALED. STORE IN COOL DRY PLACE. OBSERVE PROPER PERSONAL HYGIENE. SAFETY SHOWER SHOULD BE AVAILABLE. THE PREFERRED FIRE EXTINGUISHING MEDIA IS WATER, DRY CHEMICAL POWDER, CARBON DIOXIDE OR POLYMER FOAM. MATERIAL IS NONCOMBUSTIBLE. PROTECTADJACENT AREA!

***** INDUSTRIAL OR MANUFACTURING USE ONLY *****