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# *Evaluation of Marshall Plastics Film*

**Purpose:** To test the VCI and physical properties of the submitted sample of blue film, which was manufactured by Marshal Plastics.

**Materials:** Submitted Marshal Plastics Film
Razor Blade Test Kit
VIA Test Kit
$SO_2$ Test Kit
Perkin Elmer FT-IR 1000 Spectrometer
EM Quant Nitrite/Nitrate Test strips (Lot # OC555062, Exp 9/08)

**Method:** Razor Blade Test
VIA Test
$SO_2$ Test
FT-IR Analysis
Nitrite Test

**Procedure:** The above tests were performed according to the standard procedures for each

**Results:**

Razor Blade Test (carbon steel)

| Material | Panel #1 | Panel #2 | Panel #3 |
|---|---|---|---|
| Marshal Plastics Blue film | Fail | Fail | Fail |
| VpCI-126 film (Lot # 23929) | Pass | Pass | Pass |
| Control | Fail | Fail | Fail |

VIA Test

| Material | Panel #1 | Panel #2 | Panel #3 |
|---|---|---|---|
| Marshal Plastics Blue film | Grade 1 | Grade 1 | Grade 2 |
| VpCI-126 film (Lot # 23929) | Grade 3 | Grade 3 | Grade 3 |
| Control | Fail | Fail | Fail |

$SO_2$ Test

| Material | Panel #1 | Panel #2 | Panel #3 |
|---|---|---|---|
| Marshal Plastics Blue film | Grade 1 | Grade 1 | Grade 2 |
| VpCI-126 film (Lot # 23929) | Grade 4 | Grade 4 | Grade 4 |
| Control | Fail | Fail | Fail |

Physical Properties

| Physical Properties | Marshal Film | 126 Film |
|---|---|---|
| Mil thickness | 3 | 3 |
| Breaking Factor Machine Direction (lbs/in) | 9.28 | 9.05 |
| Breaking Factor Cross Direction (lbs/in) | 9.08 | 9.51 |
| Machine Direction Tensile Strength at Break(psi) | 3607.07 | 3156.35 |
| Cross Direction Tensile Strength at Break(psi) | 3412.17 | 3451.07 |
| Machine Direction Elongation at Break (%) | 286.5 | 522.6 |
| Cross Direction Elongation at Break (%) | 323.5 | 390.8 |
| Machine Direction Tensile Strength at Peak(psi) | 3628.81 | 3156.35 |
| Cross Direction Tensile Strength at Peak(psi) | 3412.37 | 3456.39 |
| Machine Direction Tear Strength (Newtons) | 3662.4 | 3819.36 |
| Cross Direction Tear Strength (Newtons) | 10411.68 | 17317.92 |
| Puncture Strength (Joules) | 0.83 | 0.82 |

**Conclusion:** The submitted film that was manufactured by Marshall Plastics Film did not pass any of the corrosion tests, mechanical properties on average are not as good as provided by VpCI-126 film.

**Project #:** 07-229-1125

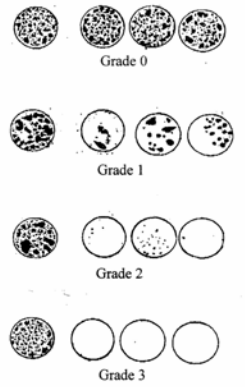
VIA Test Grades (Grade 2 or 3 are passing)

Grade 0: Blind test
No corrosion inhibiting effect

Grade 1: Blind test
Minute corrosion inhibiting effect

Grade 2: Blind test
Medium corrosion inhibiting effect

Grade 3: Blind test
Good corrosion inhibiting effect



*$SO_2$ 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 covering 5-10% of panel surface
Grade 3- Very slight corrosion covering 0-5% of panel surface
Grade 4- No visible corrosion on panel surface

# FTIR Analysis

Submitted Marshall Plastics Film