

Rapport

Report

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3020-11-0103
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Dato Date 25.05.11



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Dato Date 25.05.11	Utarbeidet av Prepared by Sharon M. Løver <i>Sharon M. Løver</i>	Godkjent av Approved by Gry Eian <i>Gry Eian</i>	Innleveringsdato for prøve Date of receipt of test object 11.03.11 Prøvetaking utført av TI Sampling by TI Nei No
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The National Institute of Technology received a package on March 11, 2011, which upon opening was found to contain a metal plate. This plate was sent to the material laboratory in order to divide the metal plate into the ideal sized specimens for the corrosion test. The metal plate was divided into 20 individual specimens of similar size. Nine of the specimens were used during the corrosion test. The nine specimens were first cleaned with a mixture of magnesium oxide and glycerin, rinsed with tap water, rinsed with de-ionized water and finally with acetone. These nine specimens were then inspected using a microscope. None of the nine specimens showed any signs of pitting under microscope inspection. After the inspection was finished the specimens were then weighed to the nearest 0,0001g, and placed into the Oxirate solution which was to be tested. Three different strengths of Oxirate solution were mixed; 1 vol %, 5 vol. % and 7.5 vol %. Three of the specimens were placed in the each of the different Oxirate solutions, the specimens were left in the Oxirate solutions for a total of 1 hour, 24 hours and 60 hours. After one hour one plate was removed from each of the different strengths, these plates were washed with tap water, rinsed with de-ionized water and finally rinsed with acetone. The specimens were then reweighed and the weight loss was noted. The specimens were then inspected under a microscope to look for any pitting which may have occurred during the test. The same procedure was repeated after 24 hours and again after 60 hours. The weight loss and comments from the microscope inspection are listed in the tables below.

Exposure time: 1 hour at room temperature:

Concentration	1 %	5 %	7,5 %
Intial weight	11,6689 g	12,2684 g	11,1419 g
Final weight	11,6688 g	12,2684 g	11,1419 g
Weight loss	0,0001 g	0 g	0 g
Microscope before testing	No visible pitting	No visible pitting	No visible pitting
Microscope after testing	No visible pitting	No visible pitting	No visible pitting

Exposure time: 24 hours at room temperature:

Concentration	1 %	5 %	7,5 %
Intial weight	11,7707 g	12,2638 g	11,3099 g
Final weight	11,7706 g	12,2635 g	11,3096 g
Weight loss	0,0001 g	0,0003 g	0,0003 g
Microscope before testing	No visible pitting	No visible pitting	No visible pitting
Microscope after testing	No visible pitting	No visible pitting	No visible pitting

Exposure time: 60 hours at room temperature:

Concentration	1 %	5 %	7,5 %
Intial weight	12,0210 g	11,6001 g	12,8660 g
Final weight	12,0207 g	11,6001 g	12,8660 g
Weight loss	0,0003 g	0 g	0 g
Microscope before testing	No visible pitting	No visible pitting	No visible pitting
Microscope after testing	No visible pitting	No visible pitting	No visible pitting

The same procedure was also preformed on four different materials received at the laboratory on March 15th. The four different materials received were:

1. Polyesterlakk, 2 pieces.
2. PVC Laminat, 2 pieces.
3. Plastisol, 1 piece
4. GPR, 1 piece

These four different materials were sent to the Vannskjærcenteret in order to cut out 9 even sized pieces of the material. Polyesterlakk was cut into 9 specimens of approximately 40 * 20 mm. The nine specimens were

first cleaned with a mixture of magnesium oxide and glycerin, rinsed with tap water, rinsed with de-ionized water and finally with acetone. These nine specimens were then inspected using a microscope. None of the nine specimens showed any signs of pitting under microscope inspection. After the inspection was finished the specimens were then weighed to the nearest 0,0001g, and placed into the Oxirate solution which was to be tested. Three different strengths of Oxirate solution were mixed; 1 vol %, 5 vol. % and 7.5 vol %. Three of the specimens were placed in the each of the different Oxirate solutions, the specimens were left in the Oxirate solutions for a total of 1 hour, 24 hours and 60 hours. After one hour one plate was removed from each of the different strengths, these plates were washed with tap water, rinsed with de-ionized water and finally rinsed with acetone. The specimens were then reweighed and the weight loss was noted. The specimens were then inspected under a microscope to look for any pitting which may have occurred during the test. The same procedure was repeated after 24 hours and again after 60 hours. The weight loss and comments from the microscope inspection are listed in the tables below.

POLYESTERLAKK:

Exposure time: 1 hour at room temperature:

Concentration	1 %	5 %	7,5 %
Intial weight	3,0548 g	3,0445 g	3,0416 g
Final weight	3,0547 g	3,0443 g	3,0413 g
Weight loss	0,0001 g	0,0002 g	0,0003 g
Microscope before testing	No visible pitting	No visible pitting	No visible pitting
Microscope after testing	No visible pitting	No visible pitting	No visible pitting

Exposure time: 24 hours at room temperature:

Concentration	1 %	5 %	7,5 %
Intial weight	3,0654 g	3,0547 g	3,0566 g
Final weight	3,0640 g	3,0535 g	3,0553 g
Weight loss	0,0014 g	0,0012 g	0,0013 g
Microscope before testing	No visible pitting	No visible pitting	No visible pitting
Microscope after testing	No visible pitting	No visible pitting	No visible pitting

Exposure time: 60 hours at room temperature:

Concentration	1 %	5 %	7,5 %
Intial weight	3,0579 g	3,0492 g	3,0433 g
Final weight	3,0539 g	3,0446 g	3,0392 g
Weight loss	0,0040 g	0,0046 g	0,0041 g
Microscope before testing	No visible pitting	No visible pitting	No visible pitting
Microscope after testing	No visible pitting	No visible pitting	No visible pitting

PVC Laminat was cut into 9 specimens of approximately 40 * 50 mm. The nine specimens were first cleaned with a mixture of magnesium oxide and glycerin, rinsed with tap water, rinsed with de-ionized water and finally with acetone. These nine specimens were then inspected using a microscope. None of the nine specimens showed any signs of pitting under microscope inspection. After the inspection was finished the specimens were then weighed to the nearest 0,0001g, and placed into the Oxirate solution which was to be tested. Three different strengths of Oxirate solution were mixed; 1 vol %, 5 vol. % and 7.5 vol %. Three of the specimens were placed in the each of the different Oxirate solutions, the specimens were left in the Oxirate solutions for a total of 1 hour, 24 hours and 60 hours. After one hour one plate was removed from each of the different strengths, these plates were washed with tap water, rinsed with de-ionized water and finally rinsed with acetone. The specimens were then reweighed and the weight loss was noted. The

specimens were then inspected under a microscope to look for any pitting which may have occurred during the test. The same procedure was repeated after 24 hours and again after 60 hours. The weight loss and comments from the microscope inspection are listed in the tables below.

PVC LAMINAT:

Exposure time: 1 hour at room temperature:

Concentration	1 %	5 %	7,5 %
Intial weight	9,5014 g	9,5039 g	9,5388 g
Final weight	9,5011 g	9,5036 g	9,5385 g
Weight loss	0,0003 g	0,0003 g	0,0003 g
Microscope before testing	No visible pitting	No visible pitting	No visible pitting
Microscope after testing	No visible pitting	No visible pitting	No visible pitting

Exposure time: 24 hours at room temperature:

Concentration	1 %	5 %	7,5 %
Intial weight	9,4982 g	9,5023 g	9,5265 g
Final weight	9,4969 g	9,5010 g	9,5234 g
Weight loss	0,0013 g	0,0013 g	0,0031 g
Microscope before testing	No visible pitting	No visible pitting	No visible pitting
Microscope after testing	No visible pitting	No visible pitting	No visible pitting

Exposure time: 60 hours at room temperature:

Concentration	1 %	5 %	7,5 %
Intial weight	9,4708 g	9,5278 g	9,5438 g
Final weight	9,4642 g	9,5181 g	9,5344 g
Weight loss	0,0066 g	0,0097 g	0,0094 g
Microscope before testing	No visible pitting	No visible pitting	No visible pitting
Microscope after testing	No visible pitting	No visible pitting	No visible pitting

Plastisol was cut into 9 specimens of approximately 40 * 50 mm. The nine specimens were first cleaned with a mixture of magnesium oxide and glycerin, rinsed with tap water, rinsed with de-ionized water and finally with acetone. These nine specimens were then inspected using a microscope. None of the nine specimens showed any signs of pitting under microscope inspection. After the inspection was finished the specimens were then weighed to the nearest 0,0001g, and placed into the Oxitrate solution which was to be tested. Three different strengths of Oxitrate solution were mixed; 1 vol %, 5 vol. % and 7.5 vol %. Three of the specimens were placed in the each of the different Oxitrate solutions, the specimens were left in the Oxitrate solutions for a total of 1 hour, 24 hours and 60 hours. After one hour one plate was removed from each of the different strengths, these plates were washed with tap water, rinsed with de-ionized water and finally rinsed with acetone. The specimens were then reweighed and the weight loss was noted. The specimens were then inspected under a microscope to look for any pitting which may have occurred during the test. The same procedure was repeated after 24 hours and again after 60 hours. The weight loss and comments from the microscope inspection are listed in the tables below.

PLASTISOL:

Exposure time: 1 hour at room temperature:

Concentration	1 %	5 %	7,5 %
Intial weight	9,4026 g	9,3826 g	9,3847 g
Final weight	9,4019 g	9,3755 g	9,3753 g
Weight loss	0,0007 g	0,0071 g	0,0094 g
Microscope before testing	No visible pitting	No visible pitting	No visible pitting
Microscope after testing	No visible pitting	No visible pitting	No visible pitting

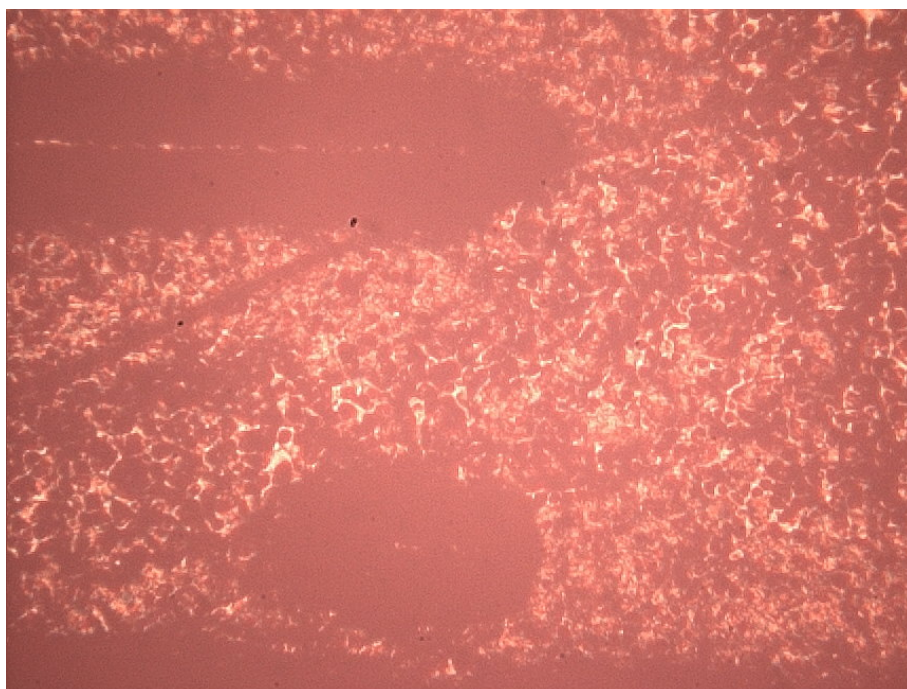
Exposure time: 24 hours at room temperature:

Concentration	1 %	5 %	7,5 %
Intial weight	9,4281 g	9,3656 g	9,4006 g
Final weight	9,4281 g	9,3646 g	9,3936 g
Weight loss	0 g	0,0010 g	0,0070 g
Microscope before testing	No visible pitting	No visible pitting	No visible pitting
Microscope after testing	No visible pitting	No visible pitting	No visible pitting

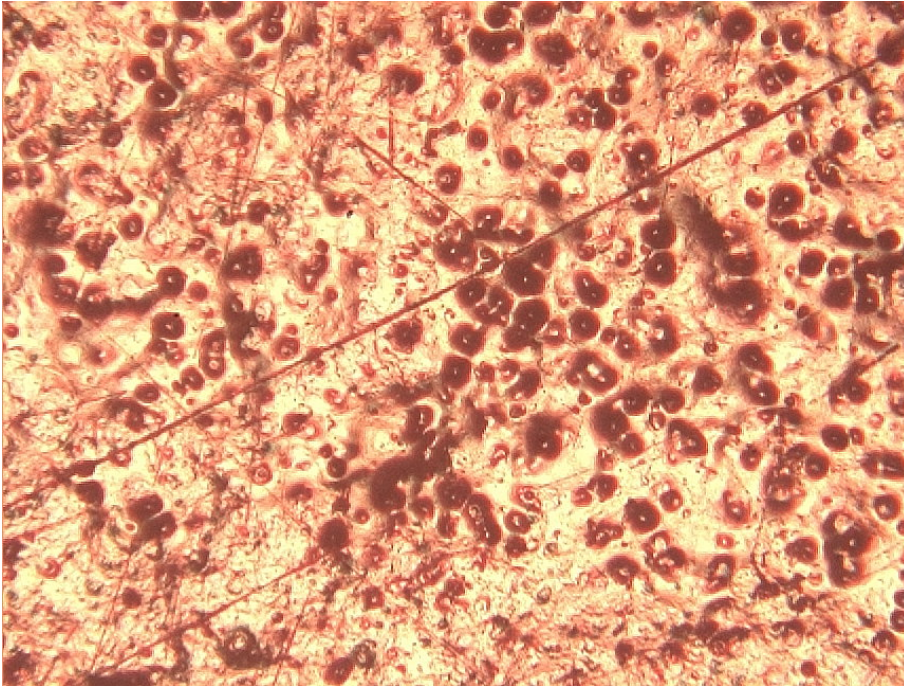
Exposure time: 60 hours at room temperature:

Concentration	1 %	5 %	7,5 %
Intial weight	9,3887 g	9,4164 g	9,4444 g
Final weight	9,3682 g	9,3843 g	9,4091 g
Weight loss	0,0205 g	0,0321 g	0,0353 g
Microscope before testing	No visible pitting	No visible pitting	No visible pitting
Microscope after testing	No visible pitting	No visible pitting	No visible pitting

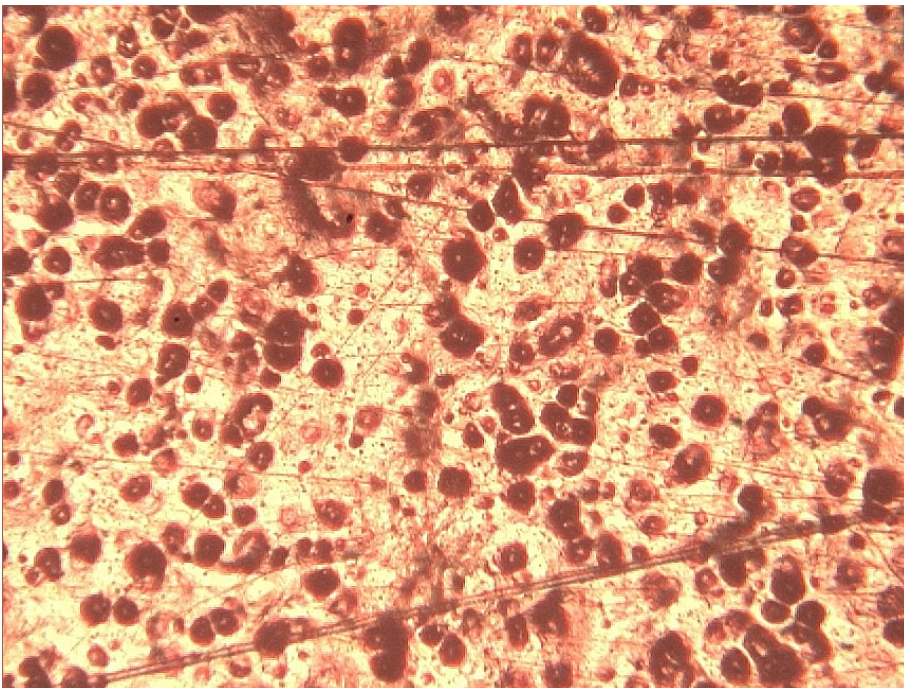
Below are some pictures of the plastisol laminat taken before and after exposure.



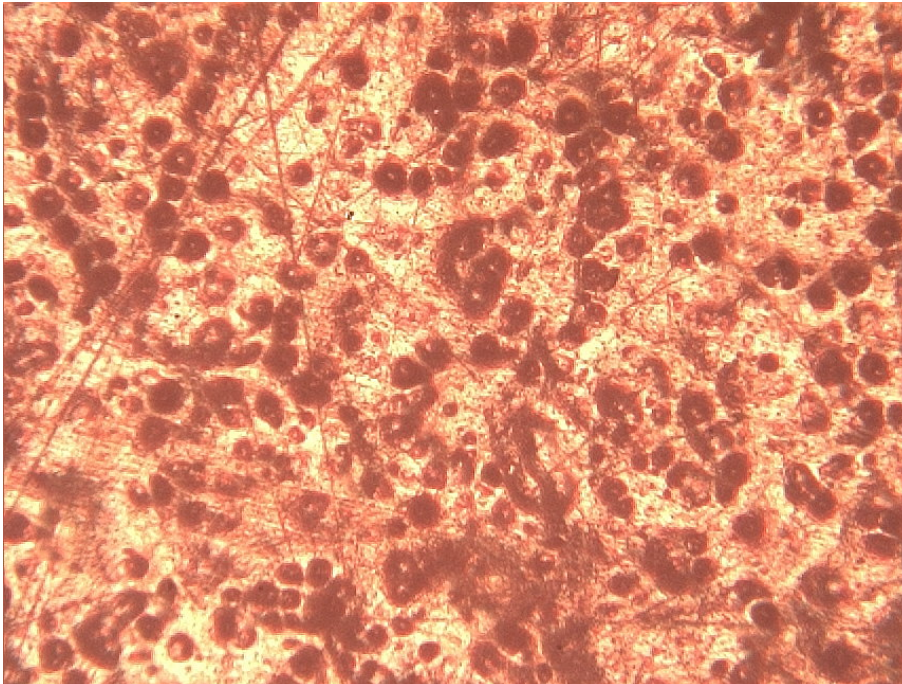
Bilde 1. Plastisol before exposure. (1x1x5)



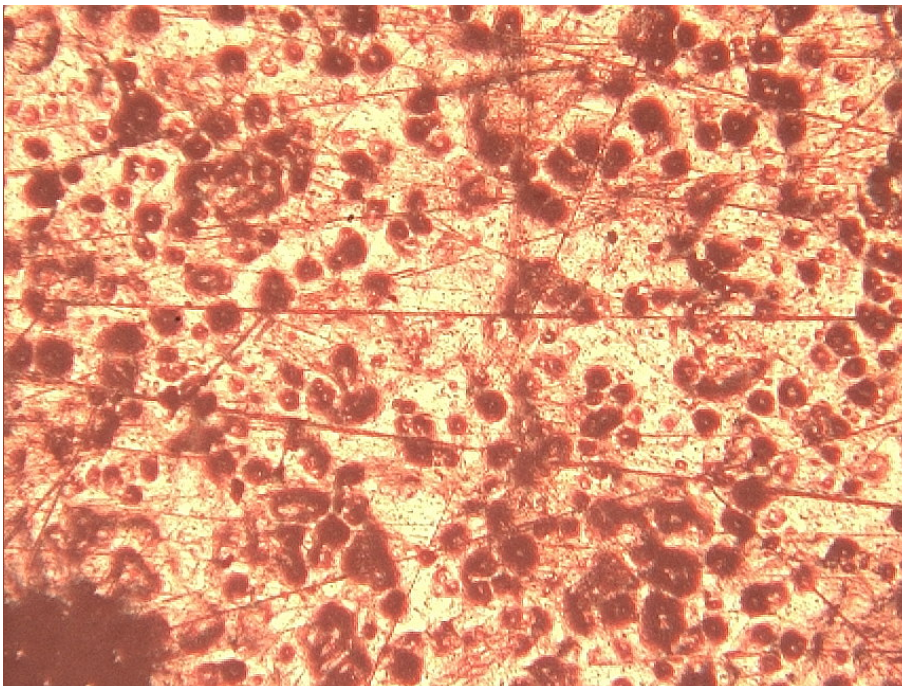
Bilde 2. Plastisol: exposure: 1hour/ 1% solution/ room temperature. (1x1x5)



Bilde 3. Plastisol: Exposure: 60hours, 7,5 % solution at room temperature. (1x1x5)



Bilde 4. Plastisol: Exposure: 60hours; 1 % solution at room temperature. (1x1x5)



Bilde 5. Plastisol: Exposure: 60 hours; 5 % solution at room temperature. (1x1x5)

GPR was cut into 9 specimens of approximately 40 * 50 mm. The nine specimens were first cleaned with a mixture of magnesium oxide and glycerin, rinsed with tap water, rinsed with de-ionized water and finally with acetone. These nine specimens were then inspected using a microscope. None of the nine specimens showed any signs of pitting under microscope inspection. After the inspection was finished the specimens were then weighed to the nearest 0,0001g, and placed into the Oxitrate solution which was to be tested. Three different strengths of Oxitrate solution were mixed; 1 vol %, 5 vol. % and 7.5 vol %. Three of the specimens were placed in the each of the different Oxitrate solutions, the specimens were left in the Oxitrate

solutions for a total of 1 hour, 24 hours and 60 hours. After one hour one plate was removed from each of the different strengths, these plates were washed with tap water, rinsed with de-ionized water and finally rinsed with acetone. The specimens were then reweighed and the weight loss was noted. The specimens were then inspected under a microscope to look for any pitting which may have occurred during the test. The same procedure was repeated after 24 hours and again after 60 hours. The weight loss and comments from the microscope inspection are listed in the tables below.

GPR:

Exposure time: 1 hour at room temperature:

Concentration	1 %	5 %	7,5 %
Intial weight	6,0385 g	5,9944 g	5,9684 g
Final weight	6,0378 g	5,9939 g	5,9680 g
Weight loss	0,0007 g	0,0005 g	0,0004 g
Microscope before testing	No visible pitting	No visible pitting	No visible pitting
Microscope after testing	No visible pitting	No visible pitting	No visible pitting

Exposure time: 24 hours at room temperature:

Concentration	1 %	5 %	7,5 %
Intial weight	6,2394 g	5,8776 g	5,9321 g
Final weight	6,2384 g	5,8766 g	5,9308 g
Weight loss	0,0010 g	0,0010 g	0,0013 g
Microscope before testing	No visible pitting	No visible pitting	No visible pitting
Microscope after testing	No visible pitting	No visible pitting	No visible pitting

Exposure time: 60 hours at room temperature:

Concentration	1 %	5 %	7,5 %
Intial weight	6,1745 g	6,5379 g	6,2190 g
Final weight	6,1702 g	6,5340 g	6,2144 g
Weight loss	0,0043 g	0,0039 g	0,0046 g
Microscope before testing	No visible pitting	No visible pitting	No visible pitting
Microscope after testing	No visible pitting	No visible pitting	No visible pitting

Conclusion:

There were no signs of corrosion observed on the specimens after the exposure times of 1 hour, 24 hours and 60 hours. The weight loss that was observed on the specimens is under 0,5% of the total weight of the specimen which is nominal. We can conclude from this that Oxirate is not corrosive against the material tested at a concentration of 1 vol. %, 5 vol. % or 7.5 vol % with an exposure time of 1, 24 or 60 hours.