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Abrasion testing of Liquid Rubber Spray Grade

Summary: The abrasion resistance of Liquid Rubber Spray Grade (LRSG) was determined using a modified Tabor abrasion test method. The results indicate that LRSG exhibits 23% lower rate of abrasive wear than EPDM, a common industrial elastomer which is widely used in abrasive environments. As such LRSG should be placed in the 'good' to 'very good' abrasion category.

Sample preparation.

The samples of LRSG used in these experiments were cut from a large sheet which had been sprayed at the Liquid Rubber Industries Research Center in October 2005. The sample sizes were 10x5 cm and 0.2 cm thick. Commercial EPDM film of similar thickness was cut to the same dimensions.

Test design

For this test procedure, the standard Tabor test conditions described in ASTM F 1677 were modified in order to better simulate the commercial applications where it is anticipated that LRSG coatings may be employed. To accomplish this the test samples were attached to adjacent arms of a rotational mixer, and fully immersed in a slurry of abrasive sand in water. The sand used was 50 mesh standard Ottawa silica sand, and the slurry composition was 30% sand in water.

Since the method used here deviates somewhat from the standard Tabor conditions it is necessary to make direct comparison between LRSG and a known standard. For this analysis the control chosen was a membrane of ethylene propylene terpolymer (EPDM), which is described in the literature as having a Tabor abrasion classification of 2, or 'good.' EPDM is widely used for the manufacture and coating of industrial materials such as hoses in which good abrasion resistance is required.

In the test performed here the LRSG and EPDM samples were subjected to rotational abrasion of 60 revolutions per minute in the silica sand slurry for 20 hours, or a total of 72,000 rotations. The samples were weighed prior to the test, and then thoroughly washed and dried after removal from the apparatus at the end of the test period. The test was performed in triplicate.

Results

Material	Run #	Initial weight, gms	Final weight , gms	Loss, gms
EPDM	1	16.4567	16.1307	0.3260
EPDM	2	15.9677	15.5682	0.3995
EPDM	3	16.9805	16.5585	0.4220
EPDM	Average			0.3825
LRSG	1	17.9430	17.6568	0.2862
LRSG	2	16.3450	16.0116	0.3334
LRSG	3	17.0450	16.7800	0.2650
LRSG	Average			0.2949

Conclusion

The average weight loss of the EPDM after 20 hours abrasion with silica sand slurry was found to be 0.3825 grams. This compared to a loss of 0.2949 grams of Liquid Rubber Spray grade over the same period. Under these conditions Spray Grade was found to abrade at about 77% as fast as EPDM membrane, and should therefore be classified as having good abrasion resistance.

Disclaimer

These tests were carried out under the conditions described in good faith. It should however be recognized that the results obtained with a short term test of this nature may not correlate with long term field performance during which other factors may come into play.

Graham Hagens, Ph.D.

Larry Firmin

From: Graham.Hagens@lafarge-na.com
Sent: Wednesday, July 12, 2006 2:13 PM
To: email7@sympatico.ca; dbilbija@cogeco.ca
Subject: abrasion resistance of LRSG

I have completed the abrasion evaluation of a cured sample of LRSG (sprayed at Parkdale).

It did well in this short 2 day test - the abrasion rate was 77% that of an EPDM control.

EPDM is widely used for various types of industrial and residential applications and is described as having good abrasion resistance.

Using the common Tabor abrasion test (ASTM D-1044) - a typical abrasion rate is 0.4 mg/1000 cycles.

We can therefore project that the Tabor abrasion of LRSG will be about 0.3 mg/1000 cycles.

We should however be aware that different results may be obtained during long term testing, or as a result of long term immersion in water, because LRSG is less water resistant than EPDM.

I will write these results up more fully under UniQem letterhead and describing the modified sand-slurry test employed.

Graham

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