



Joseph Storey
& COMPANY
LTD

Flame Test Report

Joseph Storey & Co Ltd

Job No : JS52
Commissioned by : Amorim
: Agglomerated cork products for industrial & building applications
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Application : Cork tile
Test employed : LOI
Laboratory : J Storey
Date Sent : May 2004
Date results received : 20th December 2004

Additional Information: requiring good performance to French standards M0, M1, M2, M3 and M4.

Computer filename/directory : Shani\Fire Tests\LOI\SS52 LOI Cork
Information Produced by : Louise Middleton

Formulation Page

Job No: JS52

Sample preparation

Various particle sizes of cork granules with resin where received from Amorim for testing at Lancaster using LOI.

2.5g of resin was mixed with 2.5g of different fire retardants and then 5g of fine cork added.

A second set of cork sheets where produced using 5g of resin, 5g of fire retardant and 5g of fine cork.

A third set of cork sheets where produced using 5g of resin, mixed with 0.25g of fire retardants and 5g of fine cork added.

The samples were then heated to 105°C for 15 hours under compression.

These sheets of cork where cut into 5 x 20 x 100mm strips for testing using LOI.

Three samples were taken from each sample and prepared for testing.

Results Page

Job No: JS52

Set 1	Sample Name	Oxygen Index Number	Comments
1	Blank	18.3	Sample produced a small amount of crumbly char and very little smoke as flame extinguished. Granules of cork fell off as burning but were quickly extinguished
		18.0	
		18.3	
		Average 18.2	
2	2.5g MGB 11	18.5	Same as blank.
		18.7	
		18.7	
		Average 18.6	
3	2.5g CB9578f	19.6	Same as blank.
		19.6	
		19.6	
		Average 19.6	
4	2.5g ZHS/MgOH	19.8	Same as blank.
		19.9	
		19.9	
		Average 19.9	
5	2.5g ZHS/ATH	21.0	Same as blank.
		21.0	
		21.0	
		Average 21.0	
6	2.5g MLB	21.9	Same as blank.
		22.4	
		22.5	
		22.9	
		Average 22.4	
7	2.5g ZB2335	18.9	Same as blank.
		18.8	
		18.9	
		Average 18.9	
8	2.5g ZBP	21.1	Same as blank.
		21.0	
		21.2	
		Average 21.1	
9	2.5g ZHS	18.1	Same as blank.
		18.2	
		18.3	
		Average 18.2	

Results Page Continued

Job No: JS52

Set 2	Sample Name	Oxygen Index Number	Comments
1	Blank	18.3	Sample produced a small amount of crumbly char and very little smoke as flame extinguished. Granules of cork fell off as burning but where quickly extinguished.
		18.6	
		18.2	
		Average 18.4	
2	5g MGB 11	21.1	Same as blank.
		21.0	
		21.0	
		Average 21.0	
3	5g CB9578f	21.1	Same as blank.
		21.0	
		21.1	
		Average 21.1	
4	5g ZHS/MgOH	20.0	Smouldered after the flame was extinguished.
		20.0	
		20.0	
		Average 20.0	
5	5g ZHS/ATH	21.9	Same as blank.
		21.8	
		21.8	
		Average 21.8	
6	5g MLB	20.5	Same as blank.
		20.5	
		20.5	
		Average 20.5	
7	5g ZB2335	20.3	Same as blank.
		20.1	
		20.0	
		Average 20.1	
8	5g ZBP	20.6	Same as blank.
		20.5	
		20.6	
		Average 20.6	
9	5g ZHS	21.3	Slight smouldering of sample after the flame was extinguished
		21.1	
		21.1	
		Average 21.1	

Results Page

Job No: JS52

Set 3	Sample Name	Oxygen Index Number	Comments
1	Blank	18.5	Sample produced a small amount of crumbly char and very little smoke as flame extinguished. Granules of cork fell off as burning but where quickly extinguished.
		18.7	
		18.6	
		Average 18.6	
2	0.25g MGB 11	19.4	Same as blank.
		19.6	
		19.6	
		Average 19.5	
3	0.25g MLB	20.1	Same as blank.
		20.3	
		20.3	
		Average 20.2	
4	0.25g ZBP	19.3	Same as blank.
		19.4	
		19.3	
		Average 19.3	
5	0.25g ZHS	20.0	Same as blank.
		19.7	
		19.8	
		Average 19.8	
6	0.25g APP	21.1	Same as blank.
		20.8	
		20.8	
		Average 20.9	
7	2.5g APP	25.7	Same as blank.
		26.0	
		25.8	
		Average 25.8	
8	5g APP	29.4	Same as blank.
		29.7	
		29.8	
		Average 29.6	

Summary

Job No: JS52

Set 1	Sample Name	Average LOI
1	Blank	18.2
9	2.5g ZHS	18.2
2	2.5g MGB 11	18.6
7	2.5g ZB2335	18.9
3	2.5g CB 9578f	19.6
4	2.5g ZHS/MgOH	19.9
5	2.5g ZHS/ATH	21.0
8	2.5g ZBP	21.1
6	2.5g MLB	22.4
	2.5g APP	23.4

Set 2	Sample Name	Average LOI
1	Blank	18.4
4	5g ZHS/MgOH	20.0
7	5g ZB2335	20.1
6	5g MLB	20.5
8	5g ZBP	20.6
2	5g MGB 11	21.0
3	5g CB 9578f	21.1
9	5g ZHS	21.2
5	5g ZHS/ATH	21.8
	5g APP	29.6

Set 3	Sample Name	Average LOI
1	Blank	18.6
4	0.25g ZBP	19.3
2	0.25g MGB 11	19.5
5	0.25g ZHS	19.8
3	0.25g MLB	20.2
6	0.25g APP	20.9

Observations

Job No: JS52

- No samples produced drips or split during the tests but the samples did have loose pieces of cork which came away during the tests. However these did not continue to burn when away from the main body of the sample.
- All samples from set 1 behaved in a similar manner regarding smoke, smouldering and flame to the blank.
- Most samples from set 2 behaved in a similar manner regarding smoke, smouldering and flame to the blank. However 2 of the samples did show slight smouldering after the flame was extinguished.
- No advantage was gained when the loading of MLB and ZBP was increase.
- The most significant advantage was gained when the loadings of ZHS and MGB11 were increased.

Summary of Results

Job No: JS52

At the lower loadings the STORFLAM ZBP and STORFLAM MLB gave the most promising results. However the results for these did not increase significantly with and increase in loading level. This suggests that the optimum level for these could be in the ratio 1:1 with the resin.

When the loading of the STORFLAM ZHS and STORFLAM MGB 11 was increased there was a significant improvement in the results. This suggests that the loading for optimum level for these could be in the ratio 2:1 with the resin.

However these are very high FR loadings and maybe impractical, therefore further work is being undertaken to investigate lower FR loadings of some of the more promising FRs

Appendices

Job No: JS52

ABBREVIATION	FULL NAME
APP	Ammonium Polyphosphate
CB9578f	Calcium Borate
MGB11	Magnesium Borate
ZHS/MgOH	Zinc Hydroxy Stannate coated Magnesium Hydroxide
MLB	Melamine Borate
ZB2335	Zinc Borate
ZBP	Zinc Borophosphate
ZHS	Zinc Hydroxy Stannate
ZHS/ATH	Zinc Hydroxy Stannate coated Aluminium Trihydrate

These results relate only to the behaviour of the specimens of product under the particular conditions of test; they are not intended to be the sole criterion for assessing the potential hazard of the product in use.