

NF F-16-101

Summary of Bodycote  
Warringtonfire Test Reports

WF Report Number

183843, 183845 and 183852

Date:

17<sup>th</sup> August 2009

Test Sponsor:

FP Finnprofiles OY



**Summary of Bodycote warringtonfire Report Nos.  
183843, 183845 & 183852**

**Including Opinion Of  
F Classification  
In Accordance With NF F-16-101  
Railway Rolling-Stock  
Fire Behaviour**

**Choice Of Materials and Complimented by STM-S-  
001 Technical specification – equipment RATP  
technical specification**

**Sponsored By**

**FP Finnprofiles Oy  
Lieksentie 10  
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## Test Details

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### Introduction

The sponsor of the test produces a vulcanised LTC silicone having a thickness ranging from 1mm to 10mm and approached **Bodycote warringtonfire** for assistance in assessing their range. **Bodycote warringtonfire** utilised the procedures specified in STM.S.001-C and guidance from the GT Éprouvette committee group responsible for the interpretation / review of the STM.S.001 document to assess the range.

Investigations into the behaviour of a product under the conditions of test specified in NF X 70-100 "Fire Tests. Analysis of pyrolysis and combustion gases. Tube furnace method" and NF X 10-702 "Fire test methods. Smoke emission test for measuring the specific optical density of smoke emitted by the combustion or pyrolysis of solid materials" have been conducted.

The results of the tests are fully reported in **Bodycote warringtonfire** test reports nos. 183843, 183845 and 183852.

### NF X 70-100

In accordance with STM.S.001, each of the pyrolysis tests required was carried out, where possible, on a sample of different thickness, giving emphasis to the two extreme thicknesses. The thicknesses selected for testing were 1mm and 10mm. The average concentration result obtained for each gas species was utilised to determine the CIT value. The tests conducted, therefore, covers the product having a thickness of between 1mm and 10mm.

### NF X 10-702

In accordance with STM.S.001, one formal test was conducted on the two extreme thicknesses. The thicknesses selected for testing were 1mm and 10mm. The tests conducted, therefore, covers the product having a thickness of between 1mm and 10mm.

### F rating

F ratings are calculated utilising the data determined in the NF X 70-100 test and the NF X 10-702 tests mentioned above.

The average C.I.T. value determined during the NF X 70-100 test is combined with the  $D_m$  and  $VOS_4$  value determined in the NF X 10-702 test on the vulcanized LTC silicone having a thickness of 1mm. This value is used to determine the F rating achieved by the thinnest material.

The average C.I.T. value determined during the NF X 70-100 test is combined with the  $D_m$  and  $VOS_4$  value determined in the NF X 10-702 test on the vulcanized LTC silicone having a thickness of 10mm. This value is used to determine the F rating achieved by the thickest material.

Where the two F ratings determined are the same, this is the F rating given to the complete range. Where the two F ratings are different, the F rating given to the complete range is the higher F rating (i.e. the poorer result).

This F rating summary report covers the product having a thickness of between 1mm and 10mm.

This summary test report has been prepared at the request of the sponsor and relates the results of the tests to the requirements for F classifications given in NF F 16-101 Table 4.

This summary should be read in conjunction with, and not accepted as a substitute for, the test reports nos. 183843, 183845 and 183852. These test reports may include additional information which may be relevant to the assessment of the potential fire hazard of the product.

## Description of Test Specimens

The description of the specimens given below has been prepared from information provided by the sponsor of the test. All values quoted are nominal, unless tolerances are given.

General description	Vulcanised LTC silicone profile
Product reference	<b>See Note 1 below</b>
Detailed description / composition details	<b>See Note 1 below</b>
Name of manufacturer	FP Finnprofiles Oy
Density	<b>See Note 2 below</b> 1.11g/cm <sup>3</sup> (determined by <b>Bodycote warringtonfire</b> )
Thickness	<b><u>NF X 10-702</u></b>  1mm (stated by the sponsor of the test) / 1.18mm (measured by <b>Bodycote warringtonfire</b> ) 10mm (stated by the sponsor of the test) / 10.32mm (measured by <b>Bodycote warringtonfire</b> )  <b><u>NF X 70-100</u></b>  In accordance with STM.S.001, each of the pyrolysis tests required was carried out, where possible, on a sample of different thickness, giving emphasis to the two extreme thicknesses. The thicknesses selected by the sponsor for testing were 1mm and 10mm. This test report, therefore, covers the product having a thickness of between 1mm and 10mm. 1.18mm and 10.32mm (determined by <b>Bodycote warringtonfire</b> )  <b><u>Thickness Range</u></b>  This F rating summary report covers the product having a thickness of between 1mm and 10mm.
Colour	"Black"
Trade name of flame retardant	<b>See Note 1 below</b>
Generic type of flame retardant	<b>See Note 2 below</b>
Amount of flame retardant	<b>See Note 1 below</b>
Brief description of manufacturing process	Extrusion

**Note 1. The sponsor of the test was unwilling to provide this information**

**Note 2. The sponsor of the test was unable to provide this information**

The sponsor was unwilling to provide details that would normally be included in **Bodycote warringtonfire** test reports. The description of the specimens given above therefore is not as complete as would normally be the case for descriptions included in **Bodycote warringtonfire** test reports, and the description may not fully comply with the requirements of the standard. In all other respects, however, the tests were conducted fully in accordance with the requirements of the standard and the test results are valid.

## Determination of F rating

**Results of test** The following test results were obtained for the specimens which were tested:-

NF X 10 -702 at 1mm	-	$D_m$	=	157
		$VOS_4$	=	259.5
NF X 10 -702 at 10mm	-	$D_m$	=	458
		$VOS_4$	=	158.7
NF X 70 - 100	-	C.I.T	=	3.04

### Smoke index

The "Smoke Index", notated "SI", is calculated from the value of maximum specific optical density ( $D_m$ ), the value of obscuration ( $VOS_4$ ) and the value of the conventional index of toxicity (C.I.T), which are the values obtained from tests carried out in accordance with NF X 10-702 and NF X 70-100, according to the following formula:

$$S.I. = \frac{D_m}{100} + \frac{VOS_4}{30} + \frac{C.I.T}{2}$$

At a thickness of 1mm the SI value of the material tested is 12.

At a thickness of 10mm the SI value of the material tested is 11.

### F rating determination

According to the value obtained for SI, the material is classified in one of the six classes, F0 to F5, as defined in Table 4 of NFF 16-101 reproduced below.

CLASS	VALUE OF SI
F0	$\leq 5$
F1	$\leq 20$
F2	$\leq 40$
F3	$\leq 80$
F4	$\leq 120$
F5	$> 120$

## Conclusion

**The results of the tests detailed above demonstrate that the product, as tested, can be classified as F1 in accordance with the requirements of NF F 16-101 and STM-S-001.**

This classification is based on the requirements given in NF F 16-101: October 1988 and STM-S-001. If the specification is revised or amended in any way subsequent to that date, care must be taken to ensure that this opinion is not invalidated by those revisions or amendments.

## Validity


The specification and interpretation of fire test methods are the subject of ongoing development and refinement. Changes in associated legislation may also occur. For these reasons it is recommended that the relevance of test reports over five years old should be considered by the user. The laboratory that issued the report will be able to offer, on behalf of the legal owner, a review of the procedures adopted for a particular test to ensure that they are consistent with current practices, and if required may endorse the test report.

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## Signatories

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Approved B. Dean * Technical Development Officer


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\* For and on behalf of **Bodycote warringtonfire**.

<i>Report Issued: 17<sup>th</sup> August 2009</i>
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