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Test Report: ICL/H19/10682

EN 45545-2

Railway applications— Fire protection on railway vehicles

Part 2: Requirements for fire behaviour of materials and components

Annex C Testing methods for determination of toxic gases from railway products.

Clause C.2 Method 1.

Sponsored By

SMU Powder Coatings
AkzoNobel Center
Christian Neefstraat 2
1077 WW Amsterdam
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1 Introduction

Tests were undertaken at the request of the sponsor on a specimen of a coated panel. The test was conducted in accordance with the procedures specified in EN 45545-2 Annex C “Test method for the determination of toxic gases from railway products” Clause 2 Test Method 1.

EN 45545-2 Annex C details a test procedure, the results being expressed as CIT value, for the measurement of toxic fumes generated under the conditions of test carried out in apparatus detailed in ISO 5659-2. The test on seating composite is carried out at 50kW/m² without pilot flame.

The principle of the test method ISO 5659-2 is to expose a material to specified thermal conditions of pyrolysis and combustion in a continuous procedure. The change in optical density of the smoke produced when dispersed within a fixed volume of air is recorded throughout the period of test. The resulting smoke density/time curve is used to calculate the smoke index.

Fire gas samples are taken at 4 and 8 minutes into the test and quantitative analysis carried out using FTIR.

The test method provides a means for the comparative assessment of products, however, it does not model a real fire situation and the results cannot therefore be used to describe the fire hazard of materials under actual fire conditions.

2 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.

The product was a 1.2mm thick coated metal sheet coated with a black coating referenced “Interpon Easy Clean (EC)”

The sponsor of the test has not supplied additional information relating to the paint system and method of application.

3 Conditioning Of Specimens

The specimens were received on 21st February 2019

The specimens were conditioned to constant mass in accordance with the requirements of ISO 5659-2 at $23 \pm 2^{\circ}\text{C}$ and $50 \pm 5\%$ RH, before testing.

4 Date Of Test

The tests were performed on 14th March 2019.

5 Test Procedure

The tests were carried out in accordance with the procedures specified in EN 45545 -2 Annex C Clause C.2 and this report should be read in conjunction with this standard.

One face was exposed to the heating conditions of the test.

The specimens were tested at 50kW/m^2 without pilot flame.

6 Test Results

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

The test results relate only to the specimens of the product in the form in which they were tested. Small differences in the composition or thickness of the product may significantly affect the performance during the test and will therefore invalidate the test results. It is the responsibility of the supplier of the product to ensure that the product, which is supplied, is identical with the specimens, which were tested. Uncertainty measurement has not been taken into account when presenting the test results.

The results of tests carried can be summarised as follows:-

Table 1: Toxic gas emission data at 4 minutes.

Gas species	Concentration (ppm) 4 mins			Average
	Run 1	Run 2	Run 3	
Carbon dioxide, CO ₂	4840	4720	4850	4803
Carbon monoxide, CO	54	57	54	55
Oxides of Nitrogen, NO _x	ND	ND	ND	-
Sulphur dioxide, SO ₂	ND	ND	ND	-
Hydrogen Chloride, HCl	ND	ND	ND	-
Hydrogen Bromide, HBr	ND	ND	ND	-
Hydrogen Fluoride, HF	ND	ND	ND	-
Hydrogen Cyanide, HCN	ND	ND	ND	-

Table 2: Toxic gas emission data at 8 minutes.

Gas species	Concentration (ppm) 8 mins			Average
	Run 1	Run 2	Run 3	
Carbon dioxide, CO ₂	5050	5100	4950	5033
Carbon monoxide, CO	62	57	59	59
Oxides of Nitrogen, NO _x	ND	ND	ND	-
Sulphur dioxide, SO ₂	ND	ND	ND	-
Hydrogen Chloride, HCl	ND	ND	ND	-
Hydrogen Bromide, HBr	ND	ND	ND	-
Hydrogen Fluoride, HF	ND	ND	ND	-
Hydrogen Cyanide, HCN	ND	ND	ND	-

Table 3: CIT_G calculations for 4 minutes

Gas species	ci (mg/m ³)	Ci (mg/m ³)	CIT _G
Carbon dioxide, CO ₂	7792.45	72000	0.009
Carbon monoxide, CO	55.67	1380	0.003
Oxides of Nitrogen, NO _x	ND	38	0
Sulphur dioxide, SO ₂	ND	262	0
Hydrogen Chloride, HCl	ND	75	0
Hydrogen Bromide, HBr	ND	99	0
Hydrogen Fluoride, HF	ND	25	0
Hydrogen Cyanide, HCN	ND	55	0
CIT _G			0.012

Table 4: CIT_G calculations for 8 minutes

Gas species	ci (mg/m ³)	Ci (mg/m ³)	CIT _G
Carbon dioxide, CO ₂	8103.72	72000	0.009
Carbon monoxide, CO	60.80	1380	0.004
Oxides of Nitrogen, NO _x	ND	38	0
Sulphur dioxide, SO ₂	ND	262	0
Hydrogen Chloride, HCl	ND	75	0
Hydrogen Bromide, HBr	ND	99	0
Hydrogen Fluoride, HF	ND	25	0
Hydrogen Cyanide, HCN	ND	55	0
CIT _G			0.013

7 **Requirements**

The following requirements are given in Table 5 of EN 45545-2 for R1

Test method reference	Parameter	Requirements for R1 Values are maximum allowed		
		HL1	HL2	HL3
T11.01 EN ISO 5659-2: 50 kWm ⁻²	<i>CITG</i> dimensionless	1.2	0.9	0.75

8 **Conclusion**

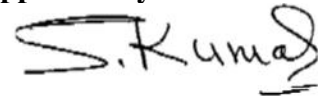
When tested in accordance with the procedure called un EN 45545-2 Annex C Clause C.2 the sheet product tested satisfies the toxicity requirements given in EN 45545-2 Table 5 R 1 for hazard level HL1, HL2 and HL3.

Prepared by



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