



中国认可  
国际互认  
检测  
TESTING  
CNAS L6069



**Report No.** TC.19.08.005853

**Date of Issue** 09/11/2019

**Applicant:** Shanghai Yifeng New Materials Co.,Ltd.

**Applicant address:** 350 Zhuang North Road, Fengxian District, Shanghai

**Description of the test subject:**

Sample	Description	Photo
001	<p>Sample Number: WIRING DUCT</p> <p>Sample Description: PC+ABS Material Wiring duct</p> <p>Style No.: L-VD/UD/R</p>	

**Receipt Date of Sample:** 08/30/2019

**Date of Testing:** From 08/30/2019 to 09/11/2019

**Sample submitted:** The sample(s) was (were) submitted by applicant and identified.

**Conclusion:**

Test Items			R22			R23		
No.	Items	Items	HL1	HL2	HL3	HL1	HL2	HL3
1	Oxygen index	EN 45545-2:2013+A1:2015 EN ISO 4589-2:2017	Pass	Pass	Pass	Pass	Pass	Pass
2	Smoke density testing	EN 45545-2:2013+A1:2015 EN ISO 5659-2:2017	Pass	Pass	Pass	*	Pass	Pass
3	Toxicity testing	EN 45545-2:2013+A1:2015 NF X 70-100-1/-2:2006(R2011)	Pass	Pass	Pass	*	Pass	Pass

**Note:** \*=Standards are not required

Note: (1) General Terms & Conditions as mentioned overleaf,(2)The results relate only to the items tested,(3)The test report shall not be reproduced except in full without the written approval of the company. (4) Samples are tested as received.



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### Test Results

**EN 45545-2:2013+A1:2015 Railway applications-Fire protection on railway vehicles Part2: Requirements for fire behaviour of materials and components**

**1. EN ISO 4589-2:2017 Plastics—determination of burning behavior by oxygen index Part 2: Ambient temperature test**

**1.1 Sample details:**

Specimen size:	150mm×9.5mm
Thickness:	About 3.3 mm

Precondition	Temperature	Relative humidity	Duration
	23±2°C	50±5%R.H.	24h

**1.2 Test result**

**Section 1:** Determination of oxygen concentration for one pair of “X” and “O” responses at ≤ 1 % (V/V) O<sub>2</sub> concentration interval

Oxygen concentration, % (V/V)	40.1	39.1	38.1	37.1	36.1				
Burn time, s	>180	>180	>180	>180	40				
Response (“X” or “O”)	X	X	X	X	O				

Oxygen concentration of the “O” response for the pair = 36.1 % (V/V)

(This is the concentration to be used again for the first measurement in section 2)

**Section 2:** Determination of oxygen index: Step size to be used for successive changes d in oxygen concentration = 0.2 % (V/V)

	N <sub>T</sub> series measurements									
	N <sub>L</sub> series measurements									
Oxygen concentration, % (V/V)	36.1	36.3				36.3	36.1	36.3	36.1	36.3
Burn time, s	40	>180				>180	29	>180	24	>180
Response (“X” or “O”)	O	X				X	O	X	O	X
k value	K=-0.46									

OI= C<sub>i</sub> + kd :

OI= C<sub>i</sub> + kd = 36.2 %

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k of oxygen index as following table

1	2	3	4	5	6
Test results of last five times	Previous measurement of K				
	O	OO	OOO	OOOO	
X O O O O	-0.55	-0.55	-0.55	-0.55	O X X X X
X O O O X	-1.25	-1.25	-1.25	-1.25	O X X X O
X O O X O	0.37	0.38	0.38	0.38	O X X O X
X O O X X	-0.17	-0.14	-0.14	-0.14	O X X O O
X O X O O	0.02	0.04	0.04	0.04	O X O X X
X O X O X	-0.50	-0.46	-0.45	-0.45	O X O X O
X O X X O	1.17	1.24	1.25	1.25	O X O O X
X O X X X	0.61	0.73	0.76	0.76	O X O O O
X X O O O	-0.30	-0.27	-0.26	-0.26	O O X X X
X X O O X	-0.83	-0.76	-0.75	-0.75	O O X X O
X X O X O	0.83	0.94	0.95	0.95	O O X O X
X X O X X	0.30	0.46	0.50	0.50	O O X O O
X X X O O	0.50	0.65	0.68	0.68	O O O X X
X X X O X	-0.04	0.19	0.24	0.25	O O O X O
X X X X O	1.60	1.92	2.00	2.01	O O O O X
X X X X X	0.89	1.33	1.47	1.50	O O O O O
	Previous measurement of K				Test results of last five times
	X	X X	X X X	X X X X	
	k of column 6 in above table, the symbol instead, mean $OI=ci-kd$ (see 9.1)				

**2. EN ISO 5659-2:2017 Plastics — Smoke generation —Part 2: Determination of optical density by a single-chamber test**

**2.1 Sample details:**

Specimen size	75 mm×75 mm, 3 pcs
Thickness:	About 3.3 mm

Precondition	Temperature (°C)	Humidity (%)	Duration (h)
	23±2	50±5	24

**2.2 Test results**

Test mode	The heat flux was 25 kW/m <sup>2</sup> with pilot flame
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Item	Specimens			Average
	1	2	3	
Ds(1.5)	19.2	28.0	34.2	27.1
Ds(4)	63.4	96.2	87.3	82.3
Ds(10)	84.0	93.7	88.5	88.7
Ds(max)	84.0	107.6	96.9	96.2
VOF4	153.2	231.2	220.9	201.8
T(Ds max), s	600	141	139	293

**Note:**

Ds(n): Specific optical density of smoke where n is the elapsed time since the start of testing in minutes.

VOF4:  $VOF4 = [Ds(1) + Ds(2) + Ds(3) + \frac{Ds(4)}{2}] \times 1min$

Ds(max): For each specimen, produce a graph of light transmission against time and determine the minimum percentage transmission  $T_{min}$ . Convert  $T_{min}$  to the maximum specific density  $D_{smax}$  by calculation to two significant figures using the following equation.  $D_{smax} = 132 \log 10 \frac{100}{T_{min}}$  Test duration is 10min.

T (Ds max): The time of the start of test at which the Ds(max) was made.

**Conclusion:**

Ds(max)	96.2
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**3. NF X 70-100-1:2006 (R2011) / NF X 70-100-2:2006 (R2011) Analysis of gaseous effluents -As modified by EN 45545-2:2013+A1:2015 R22/R23 at a temperature of 600°C.**

**3.1 Sample details**

Weight	S1: 1.0043 g; S2: 1.0009 g; S3: 0.9981 g
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Precondition	Temperature (°C)	Humidity (%)	Duration (h)
	23±2	50±5	At least 48

**3.2 Test results**

Gas	S 1	S 2	S 3	Average
Carbon Dioxide (CO <sub>2</sub> )	290.3	293.4	280.3	288.0
Carbon Monoxide (CO)	55.0	32.1	45.8	44.3

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Hydrogen Fluoride (HF)	0.3	0.6	0.4	0.4
Hydrogen Chloride (HCl)	ND	ND	ND	ND
Hydrogen Bromide (HBr)	ND	ND	ND	ND
Hydrogen Cyanide (HCN)	1.1	1.4	1.3	1.3
Nitrogen Dioxide (NO <sub>2</sub> )	ND	ND	ND	ND
Sulphur Dioxide (SO <sub>2</sub> )	ND	ND	ND	ND

**Note:** All values given are in mg/g.  
Where ND indicates Non-detected.

**Calculate the Index of Toxic Fume CIT<sub>NLP</sub>**

The test results obtained for toxicity measurements were used to calculate the Index of Toxic Fume CIT<sub>NLP</sub>, as described in EN 45545-2:2013+A1:2015 Annex C.16.3,

$$CIT_{NLP} = \sum_{i=1}^{i=8} \frac{Y_i}{C_i}$$

Where:

Y<sub>i</sub> is the yield of the i<sup>th</sup> gas in mgg<sup>-1</sup> in the NF X70-100-1 tube furnace;  
C<sub>i</sub> is the reference concentration of the i<sup>th</sup> gas in mg/m<sup>3</sup>, see table 2

Table 2

Gas	Reference concentration; mg/m <sup>3</sup>
Carbon Dioxide (CO <sub>2</sub> )	72000
Carbon Monoxide (CO)	1380
Hydrogen Fluoride (HF)	25
Hydrogen Chloride (HCl)	75
Hydrogen Bromide (HBr)	99
Hydrogen Cyanide (HCN)	55
Nitrogen Oxides (NO <sub>2</sub> )	38
Sulphur Dioxide (SO <sub>2</sub> )	262

**Result:**

CIT <sub>NLP</sub>	0.076
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**Requirement of EN 45545-2:2013+A1:2015 R22 & R23:**

Item	Vehicle category(R22)			Vehicle category(R23)		
	HL1	HL2	HL3	HL1	HL2	HL3
OI%(min)	28	28	32	28	28	32
Ds max(max)	600	300	150	*	600	300
CIT <sub>NLP</sub> (max)	1.2	0.9	0.75	*	1.8	1.5

**Conclusion:**

Item	Record	Vehicle category(R22)			Vehicle category(R23)		
		HL1	HL2	HL3	HL1	HL2	HL3
OI%	36.2	Pass	Pass	Pass	Pass	Pass	Pass
Ds max	96.2	Pass	Pass	Pass	*	Pass	Pass
CIT <sub>NLP</sub>	0.076	Pass	Pass	Pass	*	Pass	Pass

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

Changzhou Jinbiao Railway Transportation Technical Service Co., Ltd.

Drafted by:

Lynn liu

Approved by:

Shen hui

-End of Report-

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