



中国认可
国际互认
检测
TESTING
CNAS L6069



Test Report

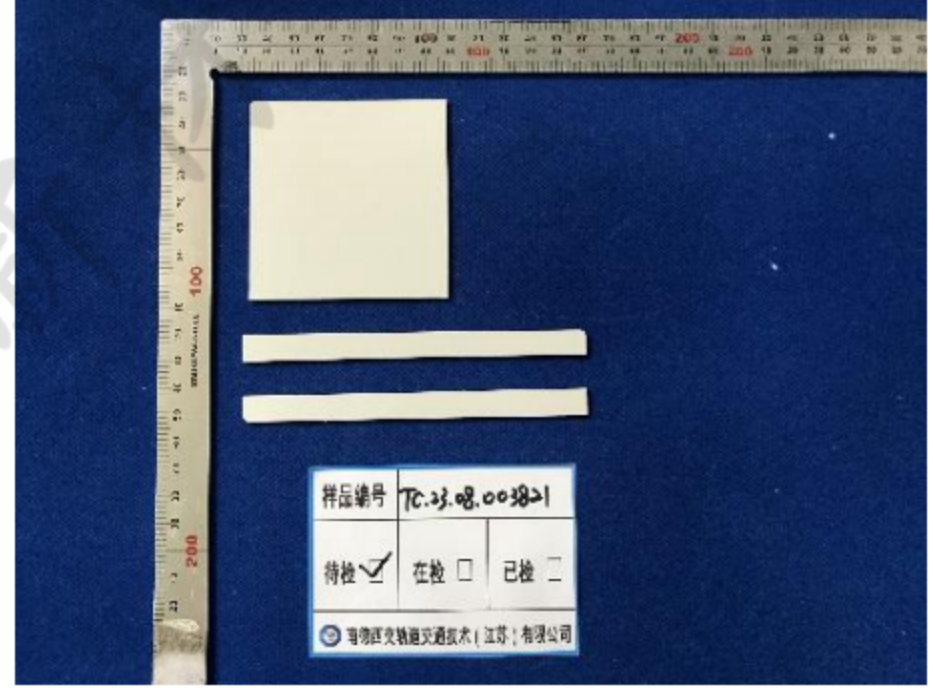
Report No. TC.23.08.003821

Date of Issue 08/23/2023

Applicant: Shanghai Yifeng New Materials Co., Ltd.

Applicant address: Building 10, No.228, Xihan Road, Nanqiao Town, Fengxian District, Shanghai

Description of the test subject:

Sample	Description	Photo
001	Sample Description: low smoke and halogen-free wiring duct Style No.: L-VD/UD/R	

Receipt Date of Sample: 08/15/2023

Date of Testing: From 08/15/2023 to 08/23/2023

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

Conclusion:

Test Items			R22			R23		
No.	Items	Standard	HL1	HL2	HL3	HL1	HL2	HL3
1	Oxygen index	EN 45545-2:2020 EN ISO 4589-2:2017	Pass	Pass	Pass	Pass	Pass	Pass
2	Density of smoke	EN 45545-2:2020 EN ISO 5659-2:2017	Pass	Pass	Pass	*	Pass	Pass
3	Toxicity index	EN 45545-2:2020 EN 17084:2018	Pass	Pass	Pass	*	Pass	Pass

Remark: *=Standards are not required.

Note: (1) The TÜV SÜD SW Rail Transportation Technology (Jiangsu) Co., Ltd. General Terms & Conditions applied, for full content please visit <https://www.tuvsud.cn/zh-cn/terms-and-conditions>. (2) The results relate only to the sample(s) as received. (3) The test report shall not be reproduced except in full without the written approval of the company.

Laboratory:
TÜV SÜD SW Rail Transportation Technology (Jiangsu) Co., Ltd.

Phone: +86/ (0) 519- 8123-9872
Fax: +86/ (0) 519- 8123-9872 ext.123
E-mail: czx.qm@tuvsud.com
www.tuvsud.com

Regd. Office:
Innovative Industry Park, No. 377 Wuyinan Road,
National High and New Technology & Industry
Development Zone, Wujin, 213015 P.R. China



中国认可
国际互认
检测
TESTING
CNAS L6069



Test Report

Report No. TC.23.08.003821

Date of Issue 08/23/2023

Test Results

EN 45545-2:2020 Railway applications-Fire protection on railway vehicles Part 2: 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×10mm
Thickness	About 1.6 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) O₂ concentration interval

Oxygen concentration, % (V/V)	25.0	35.0	40.0	37.0	38.0				
Length burn, mm	<50	<50	>50	<50	>50				
Response (“X” or “O”)	O	O	X	O	X				

Oxygen concentration of the “O” response for the pair = 37.0 % (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 _T series measurements									
	N _L series measurements									C _f
Oxygen concentration, % (V/V)	37.0	37.2	37.4			37.4	37.2	37.0	37.2	37.4
Length burn, mm	<50	<50	>50			>50	>50	<50	<50	>50
Response (“X” or “O”)	O	O	X			X	X	O	O	X
k value	k=-0.76									

OI = C_f + k d :

OI = C_f + k d = 37.2 %

Note: (1) The TÜV SÜD SW Rail Transportation Technology (Jiangsu) Co., Ltd. General Terms & Conditions applied, for full content please visit <https://www.tuvsud.cn/zh-cn/terms-and-conditions>. (2) The results relate only to the sample(s) as received. (3) The test report shall not be reproduced except in full without the written approval of the company.

Laboratory:
TÜV SÜD SW Rail Transportation
Technology (Jiangsu) Co., Ltd.

Phone: +86/ (0) 519- 8123-9872
Fax: +86/ (0) 519- 8123-9872 ext.123
E-mail: czx.qm@tuvsud.com
www.tuvsud.com

Regd. Office:
Innovative Industry Park, No. 377 Wuyinan Road,
National High and New Technology & Industry
Development Zone, Wujin, 213015 P.R. China



中国认可
国际互认
检测
TESTING
CNAS L6069



Test Report

Report No. TC.23.08.003821

Date of Issue 08/23/2023

k of oxygen index as following table

1	2	3	4	5	6
Responses for the last five measurements	Previous measurement of k				
	O	O O	O O O	O O O O	
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				Responses for the last five measurements
	X	X X	X X X	X X X X	
	k of column 6 in above table, the symbol instead, mean OI=c _r -k _d (see 9.1)				

Note: (1) The TÜV SÜD SW Rail Transportation Technology (Jiangsu) Co., Ltd. General Terms & Conditions applied, for full content please visit <https://www.tuvsud.cn/zh-cn/terms-and-conditions>. (2) The results relate only to the sample(s) as received. (3) The test report shall not be reproduced except in full without the written approval of the company.

Laboratory:
TÜV SÜD SW Rail Transportation
Technology (Jiangsu) Co., Ltd.

Phone: +86/ (0) 519- 8123-9872
Fax: +86/ (0) 519- 8123-9872 ext.123
E-mail: czx.qm@tuvsud.com
www.tuvsud.com

Regd. Office:
Innovative Industry Park, No. 377 Wuyinan Road,
National High and New Technology & Industry
Development Zone, Wujin, 213015 P.R. China



中国认可
国际互认
检测
TESTING
CNAS L6069



Test Report

Report No. TC.23.08.003821

Date of Issue 08/23/2023

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
Thickness	About 1.6 mm

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

2.2 Test results

Test mode	The heat flux was 25 kW/m ² with pilot flame
-----------	---

Parameter	Specimens			Average
	1	2	3	
Ds(1.5)	2.5	3.2	3.7	3.1
Ds(4)	28.7	41.8	60.6	43.7
Ds(10)	40.0	42.1	64.1	48.7
Ds(max)	40.0	46.3	64.1	50.1
VOF4	50.0	81.9	115.5	82.5
T(Ds max), s	600	216	600	472

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} . Covert 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)	50.1
---------	------

Note: (1) The TÜV SÜD SW Rail Transportation Technology (Jiangsu) Co., Ltd. General Terms & Conditions applied, for full content please visit <https://www.tuvsud.cn/zh-cn/terms-and-conditions>. (2) The results relate only to the sample(s) as received. (3) The test report shall not be reproduced except in full without the written approval of the company.

Laboratory:
TÜV SÜD SW Rail Transportation
Technology (Jiangsu) Co., Ltd.
检验检测专用章
Inspection & Testing Stamp

Phone: +86/ (0) 519- 8123-9872
Fax: +86/ (0) 519- 8123-9872 ext.123
E-mail: czx.qm@tuvsud.com
www.tuvsud.com

Regd. Office:
Innovative Industry Park, No. 377 Wuyinan Road,
National High and New Technology & Industry
Development Zone, Wujin, 213015 P.R. China



中国认可
国际互认
检测
TESTING
CNAS L6069



Test Report

Report No. TC.23.08.003821

Date of Issue 08/23/2023

3. EN 17084:2018 Railway applications- Fire protection in railway vehicles- Toxicity test of materials and components-Method 2

3.1 Sample details

Weight	S1: 1.0026 g; S2: 1.0015 g; S3: 1.0011 g
--------	--

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

3.2 Test results

Gas	Unit	MDL	S 1	S 2	S 3	Average
Carbon Dioxide (CO ₂)	%	0.004	1.55	1.56	1.58	1.56
Carbon Monoxide (CO)	ppm	5	4852.0	4876.0	4816.0	4848.0
Hydrogen Fluoride (HF)	ppm	0.05	0.3	0.3	0.3	0.3
Hydrogen Chloride (HCl)	ppm	0.05	0.9	1.0	0.9	0.9
Hydrogen Bromide (HBr)	ppm	0.1	ND	ND	ND	ND
Hydrogen Cyanide (HCN)	ppm	0.3	2.1	2.1	2.1	2.1
Nitrogen Dioxide (NO ₂)	ppm	0.5	15.0	18.0	17.0	16.7
Sulphur Dioxide (SO ₂)	ppm	0.1	0.6	0.7	0.6	0.6

Note: Where ND indicates Non-detected.

Where MDL indicates Method Detection Limit.

Note: (1) The TÜV SÜD SW Rail Transportation Technology (Jiangsu) Co., Ltd. General Terms & Conditions applied, for full content please visit <https://www.tuvsud.cn/zh-cn/terms-and-conditions>. (2) The results relate only to the sample(s) as received. (3) The test report shall not be reproduced except in full without the written approval of the company.

Laboratory:
TÜV SÜD SW Rail Transportation
Technology (Jiangsu) Co., Ltd.



Phone: +86/ (0) 519- 8123-9872
Fax: +86/ (0) 519- 8123-9872 ext.123
E-mail: czx.qm@tuvsud.com
www.tuvsud.com

Regd. Office:
Innovative Industry Park, No. 377 Wuyinan Road,
National High and New Technology & Industry
Development Zone, Wujin, 213015 P.R. China



中国认可
国际互认
检测
TESTING
CNAS L6069



Test Report

Report No. TC.23.08.003821

Date of Issue 08/23/2023

Calculate the Index of Toxic Fume CIT_{NLP}

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

Where:

Y_i is the yield of the ith gas in mgg⁻¹ in the tube furnace;

C_i is the reference concentration of the ith gas in mg/m³, see table 2

Table 2

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

Result:

CIT _{NLP}	0.26
--------------------	------

Note: (1) The TÜV SÜD SW Rail Transportation Technology (Jiangsu) Co., Ltd. General Terms & Conditions applied, for full content please visit <https://www.tuvsud.cn/zh-cn/terms-and-conditions>. (2) The results relate only to the sample(s) as received. (3) The test report shall not be reproduced except in full without the written approval of the company.

Laboratory:
TÜV SÜD SW Rail Transportation
Technology (Jiangsu) Co., Ltd.



Phone: +86/ (0) 519- 8123-9872
Fax: +86/ (0) 519- 8123-9872 ext.123
E-mail: czx.qm@tuvsud.com
www.tuvsud.com

Regd. Office:
Innovative Industry Park, No. 377 Wuyinan Road,
National High and New Technology & Industry
Development Zone, Wujin, 213015 P.R. China



中国认可
国际互认
检测
TESTING
CNAS L6069



Test Report

Report No. TC.23.08.003821

Date of Issue 08/23/2023

Requirement of EN 45545-2:2020 R22 & R23:

Items	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 _{NLP} (max)	1.2	0.9	0.75	*	1.8	1.5

Conclusion:

Items	Record	Vehicle category(R22)			Vehicle category(R23)		
		HL1	HL2	HL3	HL1	HL2	HL3
OI%	37.2	Pass	Pass	Pass	Pass	Pass	Pass
Ds(max)	50.1	Pass	Pass	Pass	*	Pass	Pass
CIT _{NLP}	0.26	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. Test results are just for internal reference.

TÜV SÜD SW Rail Transportation Technology (Jiangsu) Co., Ltd.

Drafted by:

Approved by:

Jinqiang Zhou

Wayne Wang

-End of Report-

Note: (1) The TÜV SÜD SW Rail Transportation Technology (Jiangsu) Co., Ltd. General Terms & Conditions applied, for full content please visit <https://www.tuvsud.cn/zh-cn/terms-and-conditions>. (2) The results relate only to the sample(s) as received. (3) The test report shall not be reproduced except in full without the written approval of the company.

Laboratory:
TÜV SÜD SW Rail Transportation
Technology (Jiangsu) Co., Ltd.



Phone: +86/ (0) 519- 8123-9872
Fax: +86/ (0) 519- 8123-9872 ext.123
E-mail: czx.qm@tuvsud.com
www.tuvsud.com

Regd. Office:
Innovative Industry Park, No. 377 Wuyinan Road,
National High and New Technology & Industry
Development Zone, Wujin, 213015 P.R. China