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检测
TESTING
CNAS L6069



Test Report

Report No. TC.25.04.001531

Date of Issue 2025-04-29



Applicant: Shanghai Hualun Instruments & Electronics Co.,Ltd.

Applicant Address: Qianyang Road, Lane 271, Shanghai

Sample Description: PPS (Insert of T/B MS Hualun Connector)

Material Manufacturer: Solvay Specialty Polymers USA LLC RYTON:R-7-120

UL No.: E95746-
Component-Plastics

Receipt Date of Sample: Received on 2025-04-17

Date of Testing: From 2025-04-17 to 2025-04-24

Sample Submitted: The Sample(s) and Its (Their) Information(s) Was (Were) Submitted by Applicant and Identified.

Test Result: Refer to Next Page.

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

Prepared by:

Wang Kai

Kai Wang

Approved by:

Wayne

Wayne Wang

Note:

(1) Each order is subject to acceptance of our [General Terms and Conditions](#) and the [TÜV SÜD Testing, Certification, Validation and Verification Regulation](#), in the version valid at the time the contract is concluded. For full version of above both documents, please visit the link to view.

(2) The results in this report are relevant only to the sample(s) tested.

(3) The test report shall not be reproduced except in full without the written approval of the laboratory.

(4) Disclaimer Measurement Uncertainty:

Unless otherwise stated, the decision rule for conformity reporting is based on Binary Statement for Simple Acceptance Rule (w=0) stated in ILAC-G8:09/2019 or CNAS-GL015:2022.

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Description of the test subject

Sample	Description	Picture of Sample
001	PPS (Insert of T/B MS Hualun Connector)	

Conclusion:

Test Items		Standard	R22			R23		
			HL1	HL2	HL3	HL1	HL2	HL3
1	Oxygen index	EN 45545-2:2020+A1:2023 EN ISO 4589-2:2017	Pass	Pass	Pass	Pass	Pass	Pass
2	Density of smoke	EN 45545-2:2020+A1:2023 EN ISO 5659-2:2017	Pass	Pass	Pass	*	Pass	Pass
3	Toxicity index	EN 45545-2:2020+A1:2023 EN 17084:2018	Pass	Pass	Pass	*	Pass	Pass

Remark: *=Standards are not required.

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Test Results

EN 45545-2:2020+A1:2023 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	80mm×10mm
Thickness	About 1.8 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)	35.0	36.0	37.0	38.0	39.0				
Length burn, mm	<50	<50	<50	>50	>50				
Response (“X” or “O”)	O	O	O	X	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	37.6	37.8	37.8	37.6	37.8	37.6	37.8
Length burn, mm	<50	<50	<50	<50	>50	>50	<50	>50	<50	>50
Response (“X” or “O”)	O	O	O	O	X	X	O	X	O	X
k value	k=-0.45									

OI= C_f + kd :

OI= C_f + kd = 37.7 %



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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 -kd (see 9.1)				



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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 1.8 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
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Parameter	Specimens			Average
	1	2	3	
Ds(1.5)	1.5	2.5	3.2	2.4
Ds(4)	4.6	5.5	6.6	5.6
Ds(10)	7.5	9.1	11.3	9.3
Ds(max)	7.5	9.1	11.3	9.3
VOF4	9.2	11.5	14.8	11.8
T(Ds max), s	600	600	600	600

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)	9.3
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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: 1.0008 g; S2: 0.9996 g; S3: 1.0012 g
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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	1.09	1.02	1.00	1.04
Carbon Monoxide (CO)	ppm	5	1034	987	1067	1029
Hydrogen Fluoride (HF)	ppm	0.05	ND	ND	ND	ND
Hydrogen Chloride (HCl)	ppm	0.05	ND	ND	ND	ND
Hydrogen Bromide (HBr)	ppm	0.1	ND	ND	ND	ND
Hydrogen Cyanide (HCN)	ppm	0.3	ND	ND	ND	ND
Nitrogen Dioxide (NO ₂)	ppm	0.5	12	11	10	11
Sulphur Dioxide (SO ₂)	ppm	0.1	59.3	75.5	95.7	76.8

Note: Where ND indicates Non-detected.

Where MDL indicates Method Detection Limit.

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



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Hydrogen Cyanide (HCN)	55
Nitrogen Oxides (NO ₂)	38
Sulphur Dioxide (SO ₂)	262

Result

CIT _{NLP}	0.352
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Requirement of EN 45545-2:2020+A1:2023 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%	37.7	Pass	Pass	Pass	Pass	Pass	Pass
Ds(max)	9.3	Pass	Pass	Pass	*	Pass	Pass
CIT _{NLP}	0.352	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.

-End of Report-