

Test Report

Report No.: AJFS2402001509FF

Date: FEB.20, 2024

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HUADING GROUP CO., LIMITED

UNIT D, WORLD TRADE CENTRE, NO.122 SHUGUANG ROAD, HANGZHOU CITY, ZHEJIANG PROVINCE, THE PEOPLE'S REPUBLIC OF CHINA

Sample Description: PRINTED CIRCUIT BOARDS

SGS Ref No.: AJHL2402000612OT

Style/Item No.: 10xSPM45B-220x12_2v1

P.O. / Ref No.: PO 180124 CONTRACT NUMBER: HDC 2401701 DATACODE: 0324

Supplier Name: HUADING GROUP CO., LIMITED

Manufacturer Name: HUADING GROUP CO., LIMITED

Country of Origin: P.R.CHINA

The above sample(s) data and information was / were submitted and identified on behalf of the client.

SGS is not responsible for the authenticity, integrity and the validity of the result and / or conclusion arising therefrom of the data and information. Results apply to the sample as received.

Test Requested:

EN 45545-2:2020 Railway applications - Fire protection on railway vehicles Part 2: Requirements for fire behavior of materials and components, and testing according to Table 5 - Material requirement sets (R24).

Test Results: -- See attached sheet --

Test Period:

Sample Receiving Date : FEB.08, 2024

Test Performing Date : FEB.08, 2024 TO FEB.19, 2024

Signed for and on behalf of

SGS-CSTC Standards Technical Services Co., Ltd. Anji Branch



Echo Li
Approved Signatory

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I. Description of specimens

Sample Description	PRINTED CIRCUIT BOARDS (provided by client)
Color	Green
Size of sample	Length 90mm Width 10mm Thickness 1.6mm

II. Summary of test results

Requirement set (used for)	Test method reference	Parameter and Unit	Test results *
R24	T01 EN ISO 4589-2: OI	Oxygen content %	59.7

* For the test details, please see the appendix of this test report.

III. Conclusion

According to the test results, the submitted sample **meets** the requirements of R24 (detailed in Table 5 of EN 45545-2:2020) for **HL3** Hazard Level Classification.

Test Criteria, EN 45545-2:2020, Table 5, Material requirement sets, R24

Requirement set (used for)	Test method reference	Parameter and Unit	Maximum or Minimum	HL1	HL2	HL3
R24 (EL9)	T01 EN ISO 4589-2: OI	Oxygen content %	Minimum	28	28	32

Statements:

This declaration of conformity is only based on the result of this laboratory activity, the impact of the uncertainty of the results was not included.

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 fire hazard of the product in use.



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**APPENDIX: T01 EN ISO 4589-2:2017 Plastics —Determination of burning behaviour by oxygen Index -
--Part 2: Ambient temperature test**

Conditioning

T: 23±2°C, R.H: 50±5%, until the test sample was conditioned to constant mass.

1. Test results

Type: III; Ignition method: Top surface ignition

- 1) Select initial oxygen concentration (in accordance with 8.2.3): 32%
- 2) Determining the Preliminary Oxygen Concentration (Till pair of oxygen concentrations which gives opposite response differs by ≤1%, in accordance with 8.6)

Oxygen concentration, % (V/V)	32	36	42	46	50	55	60	59
Length burnt, (mm)	2	3	4	5	6	5	>50	6
Response, ("X" or "O")	O	O	O	O	O	O	X	O

Oxygen concentration of the "O" response for the pair =59.0% (this is the concentration to be used again for the first measurement in section below)

- 3) Determination of the oxygen index (in accordance with 8.7)

Step size to be used for successive changes d in oxygen concentration = 0.2 % [Initially to be 0.2% (V/V), unless otherwise instructed]

Parameter	N _T series measurements										
	N _L series measurements (8.7.1 and 8.7.2)						(According to the 8.7.3)				C _f
Oxygen concentration, % (V/V)	59.0	59.2	59.4	59.6	59.8	--	59.8	59.6	59.8	59.6	59.8
Length burnt, (mm)	4	5	5	6	>50	--	>50	6	>50	7	>50
Response, ("X" or "O")	O	O	O	O	X	→	X	O	X	O	X
	Column (2, 3, 4 or 5): 5						Row (1 to 16): 6				
	k value from EN ISO 4589-2 table 4: -0.45										
	Hence k= -0.45										

OI = C_f + kd = 59.8+(-0.45)×0.2

=59.7% (to one decimal place, for reporting OI)

=59.71% (to two decimal places, for calculation of and verification of d)



4) Determination of k value

Table 4-Values of k for calculating the oxygen index concentration from determinations made by Dixon's 'up-and-down' method

1	2	3	4	5	6
Responses for the last five measurements	Values of k for which the first NL determinations are				
	a) O	OO	OOO	OOOO	
XOOOO	-0.55	-0.55	-0.55	-0.55	OXXXX
XOOOX	-1.25	-1.25	-1.25	-1.25	OXXXXO
XOOXO	0.37	0.38	0.38	0.38	OXXOX
XOOXX	-0.17	-0.14	-0.14	-0.14	OXXOO
XOXOO	0.02	0.04	0.04	0.04	OXOXX
XOXOX	-0.50	-0.46	-0.45	-0.45	OXOXO
XOXXO	1.17	1.24	1.25	1.25	OXOOX
XOXXX	0.61	0.73	0.76	0.76	OXOOO
XXOOO	-0.30	-0.27	-0.26	-0.26	OOXXX
XXOOX	-0.83	-0.76	-0.75	-0.75	OOXXO
XXOXO	0.83	0.94	0.95	0.95	OOXOX
XXOXX	0.30	0.46	0.50	0.50	OOXOO
XXXOO	0.50	0.65	0.68	0.68	OOOXX
XXXOX	-0.04	0.19	0.24	0.25	OOOXO
XXXXO	1.60	1.92	2.00	2.01	OOOOX
XXXXX	0.89	1.33	1.47	1.50	OOOOO
	Values of k for which the first NL determinations are				Responses for the last five measurements
	b) X	XX	XXX	XXXX	
Are as given in the above table opposite the appropriate response in column 6, but with the sign of k reversed Hence, $OI = C_f - kd$ (see 9.1)					



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5) Verification of step size d % oxygen concentration (in accordance with 8.7.4 and 9.3)

Last six results	Oxygen concentration, % (V/V)			
	C_i	O_I	$C_i - O_I$	$(C_i - O_I)^2$
1	59.8	59.71	0.09	0.0081
2	59.6		-0.11	0.0121
3	59.8		0.09	0.0081
4	59.6		-0.11	0.0121
5	59.8		0.09	0.0081
6	59.6		-0.11	0.0121
$\sum(C_i - O_I)^2$				0.0606

a Column C_i contains the oxygen concentrations used for the measurements of C_I and for each of the 5 preceding measurements, for $n = 6$

Estimation of standard deviation:

If $2\sigma^*/3 < d < 3\sigma^*/2$ or $0.2 = d > 3\sigma^*/2$, the O_I is valid.

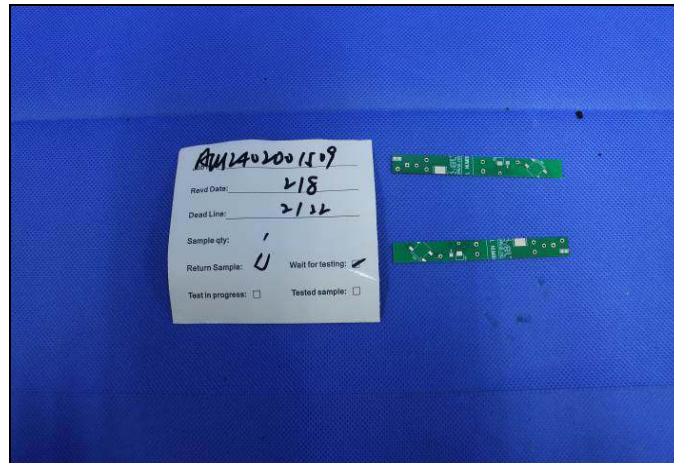
$$\sigma^* = [\sum(C_i - O_I)^2 / (n-1)]^{(1/2)} = 0.110$$

$$2\sigma^*/3 = 0.073$$

$$3\sigma^*/2 = 0.165$$

O_I is 59.7%(V/V).

Photo Appendix:



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End of Report



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