Report No. **70.400.22.0041.01-00/01**

Dated **2022-03-03**

Technical Report

Applicant: Zhejiang PFLUON New Materials Co., Ltd.
No.66,North Huayin Road, High-tech Industrial Park, Quzhou City,
Zhejiang, China. Post code:324000

Attn: Song Juan

Manufacturer: Zhejiang PFLUON New Materials Co., Ltd.

Test subject: Product: WATER-BASE FLUORORESIN NON-STICK COATING

Test specification: Test according to Council of Europe Resolution CM/Res(2013)9 on metal and alloys used in food contact materials and as stated in the **German Food & Feed Acts LFGB** and **Regulation (EC) No. 1935/2004** (Material in contact with food regulation) and **Regulation (EU) No. 10/2011 and its amendment COMMISSION REGULATION (EU) 2016/1416, 2017/752, No.2018/213 and 2018/79**.

1. For material: Non-stick coating
   — Overall migration test for compliance with Regulation (EU) No. 10/2011 and BfR Part LI
   — With reference to EN 1186-1, EN 1186-9, EN 1186-14.

2. For material: Non-stick coating
   — Specific Migration of Primary Aromatic Amine compliance with Regulation (EU) No.10/2011 and its amendment (EU) No. 2020/1245
   — Sample were migrated with food stimulant, followed by UV-Vis and LC-MS/MS

3. For material: Non-stick coating
   — Low-molecular components: Specific Migration of Chromium(VI) and Chromium (III) for compliance with the Recommendation of the BfR Part LI
   — Solvent extraction, followed by ICP-MS

4. For material: Non-stick coating
   — Specific Migration of Perfluorooctanoic acid (PFOA) and perfluorooctane sulfonates (PFOS) for compliance with Recommendation of the BfR Part LI
   — With reference to EN 1186-14 and EN1186-9, followed by LC-MS

5. For material: Non-stick coating
   — Extractable of heavy metals test in according with Council of Europe Resolution CM/Res(2013)9 on metal and alloys used in food contract materials and articles.

TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch
#151, Hengtong Road
Shanghai 200 070
P. R. China

Tel.: +86-21-6141-0123
Fax: +86-21-6140-8600
www.tuv-sud.cn
info@tuv-sud.cn

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Tel.: +86-21-6037-6501

— Solvent extraction, followed by ICP-MS

6. For material: Non-stick coating
   — Specific Migration of Heavy Metal test for compliance with Regulation (EU) No. 10/2011 and its amendment (EU) No. 2020/1245
   — Sample was migrated with suitable stimulant under intended use condition, followed by ICP-MS.

7. For material: Non-stick coating
   — Colorant Migration for compliance with Recommendation of the BfR Part IX

8. Sensory:
   — With reference to DIN 10955:2004

Test result: Refer to the data listed in following pages

Conclusion:

1.	Overall migration	Pass
2.	Specific migration of Primary Aromatic Amine	Pass
3.	Specific Migration of Chromium(VI) and Chromium (III)	Pass
4.	Specific Migration of PFOA and PFOS	Pass
5.	Extractable of heavy metals	Pass
6.	Specific Migration of Heavy Metal	Pass
7.	Colorant Migration	Pass
8.	Sensory	Pass

Remarks:

1. The result relates only to the items tested
2. Samples were tested as received
3. Samples tested were specified by client.

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1. Order

1.1 Date of Purchase Order
2022-01-24

1.2 Customer's Reference
Nil

1.3 Receipt Date of Test Sample
2022-01-21

1.4 Date of Testing
2022-01-24~2022-02-25

1.5 Document submitted
Nil

1.6 Location of Testing
TÜV PS SHA

TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch
#151, Hengtong Road
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P. R. China

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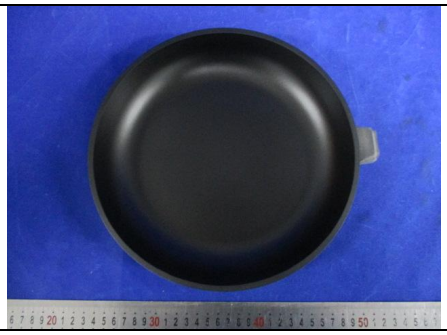
2. Description of the tested subject

No.	Tested part	Picture
001	WATER-BASE FLUORORESIN NON-STICK COATING	

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#151, Hengtong Road
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3. Test Results

3.1 Overall migration

With reference to EN1186-1, EN1186-9 and EN1186-14.
Surface area to Volume ratio: 5.4 dm^2 : 1400 ml

Simulant Used	Test Conditions [for repeated use]	Result [mg/dm^2]			Maximum Permissible Limit [mg/dm^2]
		Sample 001 1st migration	Sample 001 2nd migration	Sample 001 3rd migration	
3% acetic acid	100ºC for 4 hour	<3.0	<3.0	<3.0	3rd migration: 10, 3rd < 2nd < 1st
10% ethanol	100ºC for 4 hour	<3.0	<3.0	<3.0	
95% ethanol	60ºC for 6 hours	3.5	3.2	<3.0	
isooctane	60ºC for 4 hours	<3.0	<3.0	<3.0	

Note :
1. mg/kg denotes milligram per kilogram
2. < denotes less than
3. The specification was quoted from Council of Europe Resolution ResAP(2004)1

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#151, Hengtong Road
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P. R. China

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Shanghai Chemical Lab
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3.2 Specific Migration of Primary Aromatic Amine

Test method: As specified in Regulation (EU) No. 10/2011 and it's amendments; the sample(s) were migrated with food stimulant, followed by UV-Vis and LC-MS/MS analysis.
Testing condition and simulant: 3% acetic acid at 100 ºC for 2 hour(s).
Surface area to Volume ratio: 5.4 dm^2 : 1400 ml

Test Item	Result [mg/kg]			Maximum Permissible Limit [mg/kg]
	Sample 001 (1st migration)	Sample 001 (2nd migration)	Sample 001 (3rd migration)	
Migration of Primary Aromatic Amine	< 0.01	< 0.01	< 0.01	3rd migration: 0.01 3rd < 2nd < 1st

Test Item	CAS No.	Result [mg/kg]			Maximum Permissible Limit [mg/kg]
		Sample 001 (1st migration)	Sample 001 (2nd migration)	Sample 001 (3rd migration)	
4-aminobiphenyl	92-67-1	<0.002	<0.002	<0.002	0.002
Benzidine	92-87-5	<0.002	<0.002	<0.002	0.002
4-chloro-o-toluidine	95-69-2	<0.002	<0.002	<0.002	0.002
2-naphthylamine	91-59-8	<0.002	<0.002	<0.002	0.002
o-aminoazotoluene	97-56-3	<0.002	<0.002	<0.002	0.002
5-nitro-o-toluidine	99-55-8	<0.002	<0.002	<0.002	0.002
4-chloroaniline	106-47-8	<0.002	<0.002	<0.002	0.002
2,4-diaminoanisole	615-05-4	<0.002	<0.002	<0.002	0.002
4,4'-diaminodiphenylmethane	101-77-9	<0.002	<0.002	<0.002	0.002
3,3'-dichlorobenzidine	91-94-1	<0.002	<0.002	<0.002	0.002
3,3'-Dimethoxybenzidine	119-90-4	<0.002	<0.002	<0.002	0.002
3,3'-dimethylbenzidine	119-93-7	<0.002	<0.002	<0.002	0.002
4,4'-methylenedi-o-toluidine	838-88-0	<0.002	<0.002	<0.002	0.002
p-cresidine	120-71-8	<0.002	<0.002	<0.002	0.002
4,4'-methylene-bis-(2-chloro-aniline)	101-14-4	<0.002	<0.002	<0.002	0.002
4,4'-oxydianiline	101-80-4	<0.002	<0.002	<0.002	0.002
4,4'-thiodianiline	139-65-1	<0.002	<0.002	<0.002	0.002

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#151, Hengtong Road
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P. R. China

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o-toluidine	95-53-4	<0.002	<0.002	<0.002	0.002
2,4-toluenediamine	95-80-7	<0.002	<0.002	<0.002	0.002
2,4,5-trimethylaniline	137-17-7	<0.002	<0.002	<0.002	0.002
2-methoxyaniline	90-04-0	<0.002	<0.002	<0.002	0.002
4-aminoazobenzene	60-09-3	<0.002	<0.002	<0.002	0.002
m-Phenylenediamine (m-PDA)	108-45-2	<0.002	<0.002	<0.002	0.002

Note :
1. mg/kg denotes milligram per kilogram
2. < denotes less than
3. The specification was quoted from Regulation (EU) No. 10/2011and it's amendment (EU) No. 2020/1245.

3.3 Specific Migration of Chromium (VI) and Chromium (III)

Test method: The samples were tested migrated with food simulant, followed by ICP-OES.
Testing condition and simulant: 3% acetic acid at 100 ºC for 2 hour(s).
Surface area to Volume ratio: 5.4 dm^2 : 1400 ml

Test Item	Result [mg/dm^2]	Maximum Permissible Limit [mg/dm^2]
	Sample 001	
Chromium (VI)	<0.01	Not Detected (0.01)
Chromium (III)	<0.01	0.02

Note :
1. mg/dm^2 denotes milligram per square decimetre
2. < denotes less than
3. The specification was quoted from BfR Part LI
4. when total chromium <0.01mg/L, report Cr(VI) as <0.01mg/L

TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch
#151, Hengtong Road
Shanghai 200 070
P. R. China

Tel.: +86-21-6141-0123
Fax: +86-21-6140-8600
www.tuv-sud.cn
info@tuv-sud.cn

Shanghai Chemical Lab
No. 1999 Du Hui Road

Tel.: +86-21-6037-6501

3.4 Specific Migration of Perfluorooctanoic acid (PFOA) and perfluorooctane sulfonates (PFOS)

Test method: The samples were tested migrated with food simulant, followed by LC-MS.
Testing condition and simulant: 3% acetic acid at 100ºC for 2 hour(s).
Surface area to Volume ratio: 5.4 dm^2 : 1400 ml

Test Item	Result [mg/dm^2]	Maximum Permissible Limit [mg/dm^2]
	Sample 001	
Migration of PFOS	< 0.002	0.005

Test Item	Result [mg/dm^2]	Maximum Permissible Limit [mg/dm^2]
	Sample 001	
Migration of PFOA	< 0.002	/

Note :
1. "mg/dm^2" denotes milligram per square decimeter
2. < denotes less than
3. °C denotes degree celsius
4. Limit is quoted from BfR Part LI

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P. R. China

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No. 1999 Du Hui Road

Tel.: +86-21-6037-6501

3.5 Extractable Heavy Metal

Test method: The sample(s) were extracted with food simulant , followed by ICP-OES and ICP-MS.
Testing condition and simulant: 0.5% citric acid at 100°C for 2 hour(s).

Test Item	Result(s) [mg/kg]				Maximum Permissible Limit [mg/kg]	
	Sample 001					
	1st test	2nd test	1st+2nd test	3rd test	3rd test	1st+2nd test
Aluminium(Al)	<0.5	<0.5	<1.0	<0.5	5	35
Antimony(Sb)	<0.01	<0.01	<0.02	<0.01	0.04	0.28
Chromium(Cr)	<0.02	<0.02	<0.04	<0.02	0.25	1.75
Cobalt(Co)	<0.01	<0.01	<0.04	<0.01	0.02	0.14
Copper(Cu)	<0.2	<0.2	<0.4	<0.2	4	28
Iron (Fe)	<1.0	<1.0	<2.0	<1.0	40	280
Magnesium(Mg)	<0.05	<0.05	<0.1	<0.05	--	--
Manganese(Mn)	<0.2	<0.2	<0.4	<0.2	1.8	12.6
Molybdenum(Mo)	<0.01	<0.01	<0.04	<0.01	0.12	0.84
Nickel(Ni)	<0.02	<0.02	<0.04	<0.02	0.14	0.98
Silvery(Ag)	<0.01	<0.01	<0.02	<0.01	0.08	0.56
Tin(Sn)	<1.0	<1.0	<2.0	<1.0	100	700
Titanium(Ti)	<0.05	<0.05	<0.10	<0.05	--	--
Vanadium(V)	<0.01	<0.01	<0.02	<0.01	0.01	0.07
Zinc(Zn)	<0.5	<0.5	<0.10	<0.5	5	35
Arsenic(As)	<0.002	<0.002	<0.004	<0.002	0.002	0.014
Barium(Ba)	<0.1	<0.1	<0.2	<0.1	1.2	8.4
Beryllium(Be)	<0.001	<0.001	<0.002	<0.001	0.01	0.07
Cadmium(Cd)	<0.001	<0.001	<0.002	<0.001	0.005	0.035
Lead(Pb)	<0.01	<0.01	<0.02	<0.01	0.01	0.07
Lithium(Li)	<0.01	<0.01	<0.02	<0.01	0.048	0.336
Mercury(Hg)	<0.001	<0.001	<0.001	<0.001	0.003	0.021
Thallium(Ti)	<0.0001	<0.0001	<0.0002	<0.0001	0.0001	0.0007

Note:

1. °C denotes degree celsius

TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch
#151, Hengtong Road
Shanghai 200 070
P. R. China

Tel.: +86-21-6141-0123
Fax: +86-21-6140-8600
www.tuv-sud.cn
info@tuv-sud.cn

Shanghai Chemical Lab
No. 1999 Du Hui Road

Tel.: +86-21-6037-6501

2. < denotes less than
3. mg/kg denotes milligram per kilogram
4. The migration test was carried out three times in succession (for repeated use).
   Limit quote from Council of Europe "Technical guide on metals and alloys in food contacted materials" (1st Edition).
   The sum of the results of the first and second tests should not exceed seven times of the limit (Sum of results 1st migration+ results 2nd migration < 7*limit), results of the third test should not exceed the limit.

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#151, Hengtong Road
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P. R. China

Tel.: +86-21-6141-0123
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www.tuv-sud.cn
info@tuv-sud.cn

Shanghai Chemical Lab
No. 1999 Du Hui Road

Tel.: +86-21-6037-6501

3.6 Specific Migration of Heavy Metal

Test method: As specified in Regulation (EU) No. 10/2011 and it's amendments; the sample(s) were migrated with food simulant, followed by ICP-OES and ICP-MS analysis.

Testing condition and simulant: 3% acetic acid at 100 °C for 2 hour(s).

Test Item		Result [mg/kg]			Maximum Permissible Limit [mg/kg]	
		Sample 001 (1st migration)	Sample 001 (2nd migration)	Sample 001 (3rd migration)		
Barium	(Ba)	<0.50	<0.50	<0.50	3rd migration: 1, 3rd < 2nd < 1st	
Cobalt	(Co)	<0.05	<0.05	<0.05	3rd migration: 0.05, 3rd < 2nd < 1st	
Copper	(Cu)	<0.50	<0.50	<0.50	3rd migration: 5, 3rd < 2nd < 1st	
Iron	(Fe)	<1.00	<1.00	<1.00	3rd migration: 48, 3rd < 2nd < 1st	
Lithium	(Li)	<0.60	<0.60	<0.60	3rd migration: 0.6, 3rd < 2nd < 1st	
Manganese	(Mn)	<0.05	<0.05	<0.05	3rd migration: 0.6, 3rd < 2nd < 1st	
Zinc	(Zn)	<1.00	<1.00	<1.00	3rd migration: 5, 3rd < 2nd < 1st	
Aluminium	(Al)	<0.10	<0.10	<0.10	3rd migration: 1, 3rd < 2nd < 1st	
Nickel	(Ni)	<0.02	<0.02	<0.02	3rd migration: 0.02, 3rd < 2nd < 1st	
Antimony	(Sb)	<0.02	<0.02	<0.02	3rd migration: 0.04, 3rd < 2nd < 1st	
Arsenic	(As)	<0.01	<0.01	<0.01	ND (0.01)	
Cadmium	(Cd)	<0.002	<0.002	<0.002	ND (0.002)	
Chromium	(Cr)	<0.01	<0.01	<0.01	ND (0.01)	
Lead	(Pb)	<0.01	<0.01	<0.01	ND (0.01)	
Mercury	(Hg)	<0.01	<0.01	<0.01	ND (0.01)	
Lanthanum	(La)	<0.01	<0.01	<0.01	3rd migration: 0.05, 3rd < 2nd < 1st	Sum 0.05
Europium	(Eu)	<0.01	<0.01	<0.01	3rd migration: 0.05, 3rd < 2nd < 1st	

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Gadolinium	(Gd)	<0.01	<0.01	<0.01	3rd migration: 0.05, 3rd < 2nd < 1st	
Terbium	(Tb)	<0.01	<0.01	<0.01	3rd migration: 0.05, 3rd < 2nd < 1st	

Note :
1. mg/kg denotes milligram per kilogram foodstuff
2. < denotes less than
3. °C denotes degree celsius
4. Limit is quoted from regulation (EU) No. 10/2011 and it's amendment (EU) No. 2020/1245.

3.7 Colorant Migration

Test method: With reference to Kunststoffe im Lebensmittelverkehr Book II, Teil B II, IX.

Simulant(s) Used	Test Condition(s)	Result(s)	Limit
		001	
2% Acetic acid	50°C for 5 hours	No bleeding	No bleeding

Note :
1. % denotes percentage
2. °C denotes degree Celsius

TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch
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P. R. China

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3.8 Sensory Test

With reference to DIN 10955:2004

Testing condition and simulant: DI Water at 100 °C for 2 hour(s).

Sample	Testing parameter	Grading result	Recommended level	Conclusion
Sample 001 (Complete product)	Transfer of smell	1	<2.5	Pass
	Transfer of taste	1	<2.5	

Note:

1. < denote less than
2. Available grading are listed as follow:

Grading 0: No perceptible taste/smell deviation
1: Just perceptible taste/smell deviation
2: Weak taste/smell deviation
3: Clear taste/smell deviation
4: Strong taste/smell deviation

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Shanghai Branch
Chemical Lab

Engineer: Ms. Lu Qianwen

Checked by: Ms. Qi Nannan

-END OF REPORT -

TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch
#151, Hengtong Road
Shanghai 200 070
P. R. China

Tel.: +86-21-6141-0123
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