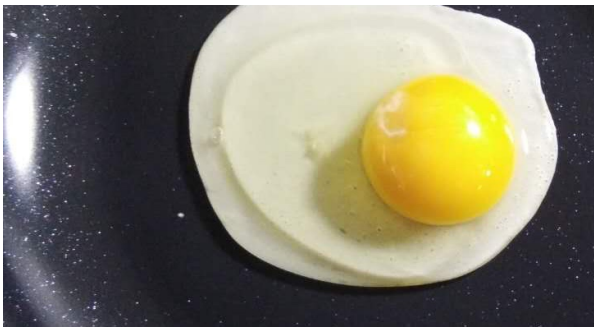
Non-Stick Ceramic Coatings CERAMOND N ii Manual



1. Outline

The ceramic coatings for household appliances produced by the new material technology and Sol-gel Procedure are made of non-stick ceramic coatings. The CeraMond N ii basic materials are composed of metal and organic materials, and the final reactant is made of ceramic.

This manual is applicable for CeraMond N ii being manufactured at Rhitz New Materials Technology Co., Ltd. It is used for coating on the surface of metal or non-metal by forming coating film layer onto the surface, which is no harmful to human beings and environmentally safe because of using alcohol and water as a solvent.

CeraMond N ii is a high-performance non-stick coating that greatly improves the non-stick due to surface modification technology. From raw materials, synthesis and manufacturing engineering to food cooking environment, it is harmless and environmentally friendly. It is an environmentally friendly ceramic coating that can replace the existing fluorine (PTFE) coating that is controversial due to environmental pollution and human harm.

2. Feature

① Kinds of contaminated matters can be easily removed with non-stick property.
② Food does not stick or burn when heated without the use of cooking oil. It is easy to fall off and is easy to clean.
③ Film Hardness shows 7H, therefore not scratched nor damaged easily.
④ From 350 ℃ high temperature to below zero (-25 ℃) under a wide range of temperature field, non-stick effect into full play.
⑤ It is not limited to dark colors, but can reflect primary colors and other colors.
⑥ Non-combustible materials that do not produce toxic and harmful gases such as fluorine and organic coatings during fire.
⑦ Such as fluorine, phenolic resin and other inflammable organic resin environmental hormones do not exist in the affinity of environmental coating.
⑧ Above 90% high efficiency of Far Infra-Red Ray emission property.。
⑨ Maintain the inherent function of original ceramic coatings (heat resistance, corrosion resistance, drug resistance, etc.).

3. Products

Product				Remark
High-grade	Inner & Outer	Base	CERAMOND N ii BP/BBP	Improved wear resistance, single layer can be used
		Spatter	CERAMOND N ii S/AS	Spatter/Uneven spatter
		Top	CERAMOND N ii X	Upgrading non-stick, high gloss(60±5)
			CERAMOND N ii T/TBP	Upgrading non-stick, medium gloss(50±5)
			CERAMOND N ii T30/TBP30	Upgrading non-stick, low gloss(40±5)

5. Characteristics

Item	Base Coat **BP/BBP,** Spatter **S/AS**	Top Coat, **X/T/T30**	Remark
Appearance	2 ~3 Liquids, Color	3 Liquids, Color	It varies according to the color
Ingredient	SiO_2, Others	SiO_2, Others	It varies according to the color and properties
Gravity	1.50 ~ 1.80	1.0～1.15	liquid A, 25℃
	1.20 ~ 1.40	0.95 ~ 0.98	Maturing coatings, 25℃
Viscosity	7 ~ 11 cps	2 ~ 6 cps	Maturing coatings, 25℃
	14 ~ 17 sec	11~13 sec	Maturing coatings, 25℃，Ford Cup No.3
Solid content	40 ~ 60%	24 ~ 44%	200℃ drying, 6hrs
Pot life	3 months	3 months	Before mixing 25℃, Except for some colors
	2 days	3~4 days	Maturing coatings 25℃
Cleaning	Water, Alcohols or its mixture	Water, Alcohols or its mixture	
Packing unit	5 kg, 20 kg/box	4 kg, 16 kg/box	

6. Properties

Test Item		Method	Result
Pencil Hardness		a. With special test instruments, the distance is 70mm. b. Visually inspect the coating surface for permanent indentations (no cohesion damage) or visible abrasions and scratches.	7H above
Adhesion		a. imprint 11 1 mm apart in coating parallel scratches, along the direction perpendicular to the scratch again repeat the above steps (100 g) b. pure water boiling c. keep 15 minutes with adhesive tape (3 m - 898) adhesion in scratch, pull tape one end, and according to the 90 ° Angle upward pull up quickly, three times in a row	100/100 (above Grade 2)
Impact Resistance		With 300g steel ball falling freely from 70cm to the inner surface of the product, the coating shall not fall off.	Passed
Heat Impact Resistance		300 ℃ ↔ 5 ℃ water 50 times, cold and hot shock, after coating cannot have blister, craze, stripping	Passed
Heat Resistance		400 ℃ / 72 hours, coating cannot have blister, craze, stripping bad	Passed
Flame Retardant		Heat source 1.5kw : Propane gas at 350℃/ 10 min, coefficient (CA)	(Class 1)1.0~2.0
Boiling brine Resistance		10% salt boiling water for 7 hours a cycle, coating surface should not bubble, corrosion point and other additional defects	2 cycles
Solvent Resistance		(BTX, Alcohol, KETON, etc. organic solvents impregnated) / 720 hours	Passed
Salt water Spray		After 8 hours of 5% brine spray, 16 hours (1 cycle), 30 cycles (720 hours)	Passed
Acid Resistance		5% acetic acid solution was injected into the sample, so that the liquid surface height was more than 2/3 of the sample height, and the cover was covered, and the coating was observed after 24 hours' rest. Check that the coating surface of the specimen is free from cracking, wrinkling and discoloration	Passed
Alkaline Resistance		Pour 20% sodium carbonate solution into the sample and let it stand at room temperature for 2 hours. Rinse and dry with clean water. Check that the coating surface of the specimen is free from cracking, wrinkling and discoloration	Passed
Abrasion Resistanc	1.5kg	Using the weight, use abrasion pad, at the same time add 0.5% concentration of commonly used detergent solution infiltrate and rub the surface of the sample in the flat area reciprocating friction, every 500 times, change abrasion pad.	8,000 cycles
	3kg		3,000 cycles
Non-Stick	Milk Test	a. Pour a full glass of milk into a saucepan, cover the bottom, and boil the milk in an electric stove or gas cooker. b. water spraying carbonation layer at 135 ° Angle of edge, carbide layer should be able to completely washed away by water. One cycle. Step to test the invisibility, do 5 cycles in a row.	5 cycles
	Fried eggs	a. about 190 ~ 210 ℃, Fried eggs to the bottom of the center, to basic solidification protein 200 + 5 ℃, checking their stick above for a cycle, b. do five consecutive circulation, c. washing pan. A ~c 1 cycles, 20 cycles (100 Fried eggs)	6 cycles

Determination of the standard:

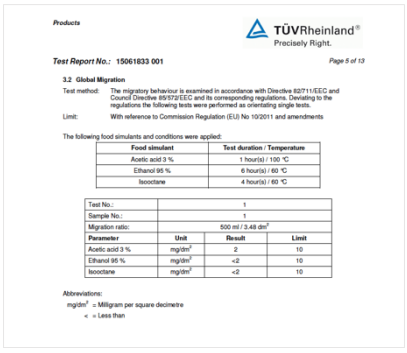
Substrate	Die-casting aluminum pan 26cm
Coatings	Inner Base CM N iii IBC W1015
	Top CM N iii IG30 28CIC
Pre-treatment	Sans Blast (#100)
Curing	270℃/10min
Thickness	35±5 ㎛
Gross	60±5 (60°)

7. Food Safety

Inspection items		The inspection results	Methods: according to the requirement and limit
Total migration		≤ 0.5 ㎎/L	According to GB31604.1-2015 & 31604.8 2016 GB, food simulation: 4% acetic acid 100 ℃ / 4 hours, limit ≤10㎎/L
		N.D.	According to GB31604.1-2015 & 31604.8 2016 GB, food simulation: 10% ethanol is 100 ℃ / 4 hours, limit ≤10㎎/L
		N.D.	According to GB31604.1-2015 & 31604.8 2016 GB, food simulation: 95% ethanol (food oil substitutes) 60 ℃ / 6 hours, limit ≤10㎎/L
		N.D.	According to GB 31604.1 2015 & 31604.8 2016 GB, food simulation: isooctane (food oil substitutes) 60 ℃ / 4 hours, limit ≤10㎎/L
Potassium permanganate consumption		≤ 2.5 ㎎/L	According to GB 31604.2 2016, food simulation: 100 ℃ water / 0.5 hours, then set aside for 24 hours at room temperature, limit ≤10㎎/L
Heavy metal lead (Pb)		≤ 3.0 ㎎/L	According to GB 31604.34 2016, food simulation: 4% acetic acid 100 ℃ / 0.5 hours, and then placed at room temperature for 24 hours, limit ≤3.0 ㎎/L
Heavy metal cadmium (Cd)		≤ 0.3 ㎎/L	According to GB 31604.24 2016, food simulation: 4% acetic acid 100 ℃ / 0.5 hours, and then placed at room temperature for 24 hours, limit ≤0.3 ㎎/L
Contain PFOA		N.D.	4% acetic acid after 100 ℃ / 2 HRS, PFOA content by LCMS analysis
FDA suitability	Non-stick coating	N.D.	According to the US FDA 21 CFR 175.300 coating ingredients extraction test
	ceramic	N.D.	According to the US FDA 7117.06/71177.07 and 7104.05 Cd, Pb, Hg cleaning test
RoHS suitability		N.D.	According to GB/T 26572-2011 limited quantity requirements of restricted substances in electronic and electrical products and 2011/65/EU on RoHS Cd, Pb, Hg, Cr+6 and another components extraction test

Determination of the standard:

Substrate	Die-casting aluminum pan 26cm
Coatings	Inner Base CM N ii IBC E0620
	Top CM N ii IG30 81CZC
Pre-treatment	Sans Blast (#100)
Curing	270℃/20min
Thickness	35±5 ㎛
Gross	50±5 (60°)


Products

TÜVRheinland®
Precisely Right.

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3.2 Global Migration

Test method: The migratory behaviour is examined in accordance with Directive 82/711/EEC and Council Directive 85/572/EEC and its corresponding regulations. Deviating to the regulations the following tests were performed as orientating single tests.

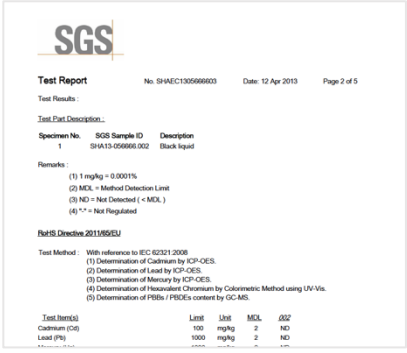
Limit: With reference to Commission Regulation (EU) No 10/2011 and amendments

The following food simulants and conditions were applied:

Food simulant	Test duration / Temperature
Acetic acid 3 %	1 hour(s) / 100 °C
Ethanol 95 %	6 hour(s) / 60 °C
Isooctane	4 hour(s) / 60 °C

Test No.:	1		
Sample No.:	1		
Migration ratio:	500 ml / 3.48 dm²		
Parameter	Unit	Result	Limit
Acetic acid 3 %	mg/dm²	2	10
Ethanol 95 %	mg/dm²	<2	10
Isooctane	mg/dm²	<2	10

Abbreviations:
mg/dm² = Milligram per square decimetre
< = Less than


SGS

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Test Results :

Test Part Description :

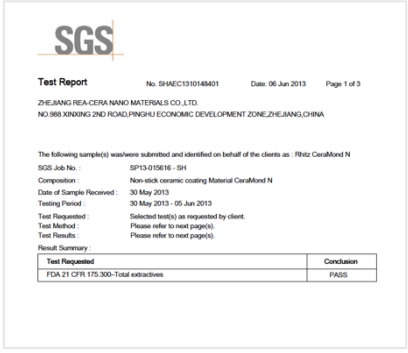
Specimen No.	SGS Sample ID	Description
1	SHA13-056666.002	Black liquid

Remarks :
(1) 1 mg/kg = 0.0001%
(2) MDL = Method Detection Limit
(3) ND = Not Detected (< MDL)
(4) "-" = Not Regulated

RoHS Directive 2011/65/EU

Test Method : With reference to IEC 62321:2008
(1) Determination of Cadmium by ICP-OES.
(2) Determination of Lead by ICP-OES.
(3) Determination of Mercury by ICP-OES.
(4) Determination of Hexavalent Chromium by Colorimetric Method using UV-Vis.
(5) Determination of PBBs / PBDEs content by GC-MS.

Test Item(s)	Limit	Unit	MDL	002
Cadmium (Cd)	100	mg/kg	2	ND
Lead (Pb)	1000	mg/kg	2	ND


SGS

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ZHEJIANG REA-CERA NANO MATERIALS CO.,LTD.
NO.988 XINXING 2ND ROAD,PINGHU ECONOMIC DEVELOPMENT ZONE,ZHEJIANG,CHINA

The following sample(s) was/were submitted and identified on behalf of the clients as : Rhitz CeraMond N

SGS Job No. : SP13-015616 - SH
Composition : Non-stick ceramic coating Material CeraMond N
Date of Sample Received : 30 May 2013
Testing Period : 30 May 2013 - 05 Jun 2013
Test Requested : Selected test(s) as requested by client.
Test Method : Please refer to next page(s).
Test Results : Please refer to next page(s).
Result Summary :

Test Requested	Conclusion
FDA 21 CFR 175.300--Total extractives	PASS

8. Product Procedure CERAMOND N II Flowchart

Pretreatment of Substrate

1. Remove contaminants and foreign matter

Cleaning: clean residues, oil, adhesives and other pollutants, remove surface foreign matter.

⚠ * Check the specification (material, size, etc.), deformation damage state, pollution state, etc.

2. Sand blasting

With aluminum or carborundum high pressure (about 7 ~ 11 ㎏ f / ㎠) sand blasting, grain for # 80~100

3. Clean

Use high - pressure water spray, compressed air, cleaning cloth to remove sandblasting granule and other foreign matter

4. Preheating

Preheating furnace temperature is 80 ~ 180 ℃, the substrate surface temperature is 60 ~ 70 ℃

Maturing CeraMond N ii

1. Rotary rolling of Base/Spatter liquid A

Rolling at 110rpm until the precipitate is completely dispersed (as per container rotation speed)

⚠ * The longer the shelf life, the longer rolling time
* If it is not rolling with Base/Spatter A Liquid container, but with electric stir, please consult us for technical problems。

2. Mix liquid A with liquid B

① Mixing of Base/Spatter Coat liquid A and liquid B

② Mixing of Top liquid A to liquid B

3. Maturation of the mixture

In the maturation room temperature 25 ~ 27 ℃, 12~15 hours 110 RPM/roll rotation speed (container)

⚠ * Pay attention to and disperse the sediment of base coat/Spatter coat liquid A. The rolling speed is same.

4. **Mix liquid C, filter and add pearl powder** (Base coat/Spatter coat/Top coat)

① Mix the maturation coatings with liquid C
If you have liquid C, you add liquid C to matured solution and roll for 110rpm/30 minutes

② Filter
The finished coating is filtered by over 300 ~ 350 mesh filters

③ When there is pearl powder, add pearl powder to the filtered maturation coatings

5. Coating

Base coat/Spatter coat/Top coat needs to be strongly stirred (800-1,000rpm high speed)

⚠ When the coating is not stirred in spraying, the coating layer will occur, so high speed and intense stirring is required. In order to ensure the uniformity and quality of the coating.

6. Drying and Curing

Drying: 80→220℃/10minutes or more
Curing : In the 220℃/20minutes ~ 270 ℃ / 10 minutes

7. Cooling and Inspection

※ Specific detailed product procedure is to refer to CeraMond General Manual.