TAMURA PRODUCT INFORMATION

CONDUCTIVE CARBON PASTE for Printing

CARBOLLOID “MRX-713J-A” is a carbon-based conductive paste for printing using special refined carbon.

1. Outstanding Features

- Having lower resistance compared with the conventional MRX-713J, it can be used for carbon jumpers, connector terminals and key contact points.
- Excellent in resistance stability with little change in resistance.
- Highly reliable coating film can be obtained as it excels in adhesion and resistance stability.

2. Main Characteristics

No.	Characteristic items (Units)	Characteristic values	Remarks
1	Viscosity (dPa・s) ※1	340~440	Brookfield HBT Spindle No.6 (at 20℃)
2	Sheet resistivity (Ω/□・15μm)	15~25	4×4mm pattern
3	Solder heat resistance	-15~+15	260℃, 10s, MH-820V
4	Adhesion on copper foil ※2	100/100	Peel test
5	Adhesion on copper foil by solder heat resistance※2	100/100	260℃, 10s, MH-820V

※1 Viscosity at the time of manufacture.(1dPa・s)

※2 Cureing condition:Hot blast circulation furnace,150℃,15min.

3. Test Data (Comparison with conventional products)

3.1 Basic Characteristics

Test items			Units	MRX-713J-A	MRX-713J
Viscosity (20℃)			dPa・s	390	330
Curing method			—	Hot blast circulation furnace	
Curing conditions			—	150℃ 15min	
Film thickness			μm	15	14
Sheet resistivity (converted in 15μm)			Ω/□	18	30
Adhesion on copper foil			—	100/100	100/100
Solder heat resistance (260℃,10s)		Rate of change in resistance	%	-4	±0
		Adhesion over copper foil	—	100/100	100/100
Fall of powder			—	○	○
P.C.T. (121℃,98%RH, 2 MPa,8h)	With dip	Rate of change in resistance	%	-11	+2
		Adhesion over copper foil	—	100/100	100/100
	Without dip	Rate of change in resistance	%	-11	-10
		Adhesion over copper foil	—	100/100	100/100
Resolution (0.4mm)	Initial stage	Over base material	mm	0.51	0.50
		Over copper foil	mm	0.53	0.51
	On 200th sheet	Over base material	mm	0.55	0.48
		Over copper foil	mm	0.56	0.49

※dip : Means dip of solder, 260℃,10s × one time.

3.2 Reliability

Test items			Units	MRX-713J-A	MRX-713J
Leaving in high temperature (100℃,1000h)		With dip	%	-5	-10
		Without dip	%	-8	-10
Leaving in humid conditions (60℃,95% RH,1000h)		With dip	%	+15	+15
		Without dip	%	+12	+15
Oil dip test (Silicone oil 260℃ 10s, 10 times)	With dip	Rate of change in resistance	%	+5	+20
		Adhesion over copper foil	—	100/100	100/100
	Without dip	Rate of change in resistance	%	+12	+20
		Adhesion over copper foil	—	100/100	100/100
Salt spray test (35℃,5% NaCl 96h)	With dip	Rate of change in resistance	%	+4	+3
		Adhesion over copper foil	—	100/100	100/100
	Without dip	Rate of change in resistance	%	+3	+3
		Adhesion over copper foil	—	100/100	100/100
Boiling test (Holding for 2h at 100℃, for 22h room temperature 4 cicles	With dip	Rate of change in resistance	%	+3	+6
		Adhesion over copper foil	—	100/100	100/100
	Without dip	Rate of change in resistance	%	+3	-7
		Adhesion over copper foil	—	100/100	100/100
Cycle test of heat resistance of solder (260℃,5s×5)		Rate of change in resistance	%	-17	+9
		Adhesion over copper foil	—	100/100	100/100
Resistance to sliding (Load 50g, 10,000 reciprocating turns)		Change in insulation resistance	Ω	10^{12}→10^{12}	10^{12}→10^{12}
		Fall of powder	—	Medium	Little

※dip : Means dip of solder, 260℃ 10s × one time.

3.3 Adhesion of Overcoat

Types of overcoat	Conveyer speed (m/min)	MRX-713J-A		MRX-713J	
		Over base material	Over copper foil	Over base material	Over copper foil
USR-2G MARUKOU NT-1	4	○	○	○	○
	6	○	○	○	○
	8	○	○	○	○
USR-11G-11	4	○	○	○	○
	6	○	○	○	○
	8	○	○	○	○

Carbon curing condition : Hot blast circulation furnace, 150℃, 15min.
Overcoat hardening condition : 120W/cm, 3 lamps, 4~8m/min
Undercoat : USR-2G MARUKOU NT-1 (120W/cm, 3 lamps, 6m/min hardening)
*Evaluation standard: ○…No peeling

3.4 Resistance to Bending

Bending radius r (cm)	Bending height X (cm) when board is 50cm long	MRX-713J-A		MRX-713J	
		Film thickness 16μm		Film thickness 17μm	
		Crack	⊿R (%)※	Crack	⊿R (%)※
15.5	16	○	-7	○	-12
14	17	○	-4	○	-12
13	17.5	○	-7	○	-11
11.5	18	×	-5	×	-7

・Base materiall : FR-1, 1.6t, 35D (Long side 110mm × short side 76mm)
・Solder resist : USR-2G MARUKOU NT-1 (UV furnace 120W/cm, 3 lamps, 6m/min)
・Undercoat (2 layers) : USR-11G-11 (UV furnace 120W/cm, 3 lamps, 6m/min)
・Carbon curing condition :Hot blast circulation furnace, 150℃, 15min.
・Test methods :
Measurement of resistance, A → Outward bending (10s) → No loading → Flux coating (MH-820V) → Dipping in solder (260℃ 10s) → Measurement of resistance, B → Crack observation (microscope)
※ ⊿R(%) : Rate of change in resistance = (Resistance B - Resistance A) × 100 / Resistance A

4. Usage and Cautions for Use

(1) Stirring and Dilution of Paste
- Stir thoroughly before use.
- When diluting, use the special thinner #713. However, keep the dilution within the limit of a few times.

(2) Treatment of Coating Surface
- Clean the surface to receive the paste. The adhesion of oil, grease or stain like oxide on the coating surface will greatly lower electrostatic quality and adhesion.

(3) Printing
- Use the emulsion thickness from 15 to 20μm on a screen made of stainless steel or Tetron with mesh size from 180 to 225.
- Use squeezee with Shore hardness approximately 70° or thereabouts.
- The amount of paste to be placed on the screen plate shall be approximately such that it can fully cover the printing surface at the turn of ink. If the amount placed was too little, it may adversely affect the printability and the thickness of coat. So be careful.
- To sure the specified characteristics, do not return the paste remaining on the screen plate back to the original container.
- Ketone based solvent or ester based solvent can be used for the washing of screens.

(4) Curing
- Perform the curing by use of a hot blast circulation furnace for at least 15 minutes after the surface temperature of boards reached 150℃.
- The specified characteristics would not be obtained if the curing were insufficient. Give thorough care therefore. for curing, therefore.
- When curing by using a far infrared furnace, use jointly a hot air furnace for a few minutes at 150℃. Sudden heating will cause blisters and/or or cracks on hardened film.

(5) Film Thickness
- The film thickness required for obtaining specified characteristics is approximately 15 to 20μm after completion of hardening.

(6) Storing
- The storage stability of the product is approximately ninety days if stored at temperature below 5℃ in the condition sealed after manufacture.
- Store the product at low temperature in refrigerators or freezers. When using, be sure to return to room temperature and then break the seal of containers.
- Never store in a place with high temperature and high humidity.

(7) To sure safety
- Since this product conditions glycolic ether, fire is strictly prohibited and ventilation has to be equipped at the place of work according to the relevant laws and regulations.
- Generally, organic solvent has nature to penetrate into the skin. Exercisare therefore not to bring you skin into direct contact with it. In case such contact was made by mistake, wash away thoroughly with soapy water and rinse with running water.
- For other details, refer to the data sheets for product safety.

Note : The contents of this publication are based on the result of experiments made by our company. However, no guarantee is given for numeric values given therein.

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