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Technical Data No. 8101-1/2

Adhesive for chip mounting machines

Seal-glo NE8800K DATA ON SAFETY

I) COMPOSITION

Seal-glo NE8800K is composed of the following materials and chemicals:

Epoxy resin oligomer
Epoxy reactive diluent
Hardener
Filler
Thixotropic agent

II) HEATING LOSS AND INGREDIENTS OF GENERATED GAS

Heating loss = 0.64 wt%

[Measuring method] Measured after keeping non-cured *Seal-glo NE8800K* in a 150℃ hot air oven for 30 minutes.

III) DATA ON CORROSION TO COPPER

A test of *Seal-glo NE8800K* on its corrosion to copper was executed.

Result : No corrosion brought forth under the conditions of 40℃ × 95%RH × 72hrs.

[Testing method] A test piece was used, namely a piece of copper plate was polished with #500 abrasive paper, *Seal-glo NE8800K* was applied onto it, and curing was made.

IV) DATA ON SAFETY

1. *Seal-glo NE8800K* is registered as one of the standard chemical substances listed in "Law Concerning the Examination and Regulation of Manufacture, etc. of Chemical Substances" and does not contain any ingredient that belongs to "Specified Chemical Substances" prescribed in the said Low.
2. *Seal-glo NE8800K* does not contain any harmful substance that is specified in Industrial Safety and Health Low.
3. *Seal-glo NE8800K* does not belong to any dangerous substance specified in Fire Service Low.
4. The value of P.I.I. can be presumed to be Class II, which is of low irritation. This product may cause skin irritation to sensitive personnel.
5. *Seal-glo* comes into the category of non-toxic chemicals, presuming from its composition valued or LD_{50}, namely 5,000-10,000 mg/kg.
6. In case *Seal-glo NE8800K* gets in touch with skin, please wash thoroughly with soap and water.

In case of eye contact, please wash out with clean water and consult a medical doctor immediately.

V) WARNING

1. Store adhesive in a refrigerator keeping the temperature less than form 2℃ to 10℃. In case *Seal-glo NE8800K* is exposed to higher temperature than 40℃, at the start stage it show a tendency to slumping owing to the reduction of the degree of thixotropy, and finally tends to initiate the curing and increase its viscosity.

This adhesive also tends to dry and vary its viscosity in case it is exposed to high humidity, and we do advise therefore to preserve tubes, cartridges, or syringes with their caps or plugs being completely closed.

2. *Seal-glo NE8800K* should be transported in cooling boxes or insulated vans/cooling vehicles.

3. *Seal-glo NE8800K* is packed through degassing process, however, we strongly recommend executing centrifugal degassing in order to prevent air from entering syringes.
   The standard degassing is to be made in the condition of 3,000 - 3,500 rpm for 10 minutes.

4. Especially in case of using *Seal-glo* for screen-printing or pin-transfer, it may happen that the adhesive exposed in the air absorbs moisture more or less.
   The moisture so absorbed evaporates as curing proceeds, especially in the case of high-temperature curing over 170℃, and solder balls get in air spaces caused by evaporation to result in lowering the insulating property of the adhesive.
   Therefore, the adhesive should be used under well-designed air-conditioning systems, particularly in hot, rainy, or highly humid seasons or environments.
   Furthermore, in case of using *Seal-glo* with solder paste, we would ask you to pay close attention to applying volume controls for the adhesive not to spread over pads.

VI) CLEANING SOLVENTS

Toluene or Ethyl acetate is recommended to apply for *Seal-glo NE8800K* cleaning solvent.

Care should be taken not to use other solvents such as alcohol, etc. in order not to cause consequent curing.

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Technical Data No. 8102-1/1

Adhesive for chip mounting machines

Seal-glo NE8800K DATA ON CHARACTERISTICS

1) DATA ON PRODUCT PROPERTIES

Items	Measured values
Specific gravity	1.28
Viscosity (25℃.5rpm)	300 Pa.s (300,000cps)
Thixotropy index	6.8
Glass transition Temp.	about 85℃
Water absorbing degree	0.80 %
Coefficient of thermal expansion	3.9×10^{-5} (50℃) 10.3×10^{-5} (150℃)

Ⅱ) DATA ON ELECTRIC CHRACTERISTICS

Data on electric property of *Seal-glo NE8800K*, attained under tests of JIS K6911 (General testing methods for thermo-setting plastics), are shown below.

Items		Measured values
Volume resistivity		2.6×10^{16} Ω·cm
Dielectric constant	30KHz	3.81
	100KHz	3.75
	1MHz	3.62
	10MHz	3.45
	30MHz	3.44
Dielectric loss tangent	30KHz	0.006
	100KHz	0.008
	1MHz	0.013
	10MHz	0.018
	30MHz	0.019

Ⅲ) HUMIDITY AGING TEST

P.C.Board applied for test : Combs pattern electrode JIS Z3197 type Ⅱ (IPC-B-25 type B)

Curing conditions :Put the P.C.Board in a hot-air oven and kept it there for 60 seconds after the temperature of the PCB has gone up to 150℃.

Test conditions :

Test Ⅰ : For 2 hours under boiling
Test Ⅱ : 40℃×95%RH×100V×96hrs.
Test Ⅲ : 85℃×85%RH×50V×1000hrs.

	Test Ⅰ	Test Ⅱ	Test Ⅲ
Primary Stage	8.6×10^{13}Ω	9.0×10^{13}Ω	9.8×10^{13}Ω
After Treating	1.0×10^{12}Ω	2.4×10^{12}Ω	1.3×10^{12}Ω

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Adhesive for chip mounting machines

Seal-glo NE8800K DATA ON ADHESIVE STRENGTH

I) ADHESIVE STRENGTH

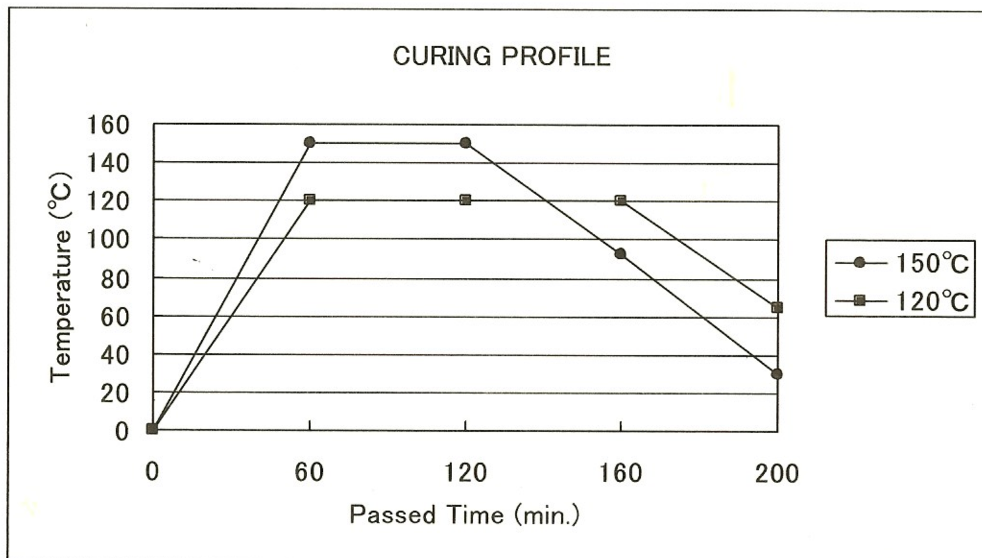
PCB applied for tests : CEM-3

Curing conditions : Put the PCB in a hot-air oven and kept it there for 60sec. after its temperature has gone up to 150℃.

Measurement of adhesive strength: Tensile strength along right angle direction with chip's shorter diam. was measured by means of push-pull gauge.

Kinds/sizes of chips	Applying amount(mg)	Adhesive strength N (kgf)
2125C	0.20mg	44N (4.5kgf)
2125R	0.20mg	45 (4.6)
3216C	0.25mg	53 (5.4)
3216R	0.25mg	54 (5.5)
Mini-mold Tr 3216 A	0.40mg	45 (4.8)
B	0.40mg	41 (4.2)
Glass Diode 3.5×1.4 ϕ	0.40mg	27 (2.8)
SOP·IC 12pins	1.60mg	74 (7.5)
24pins	3.20mg	127 (13.0)

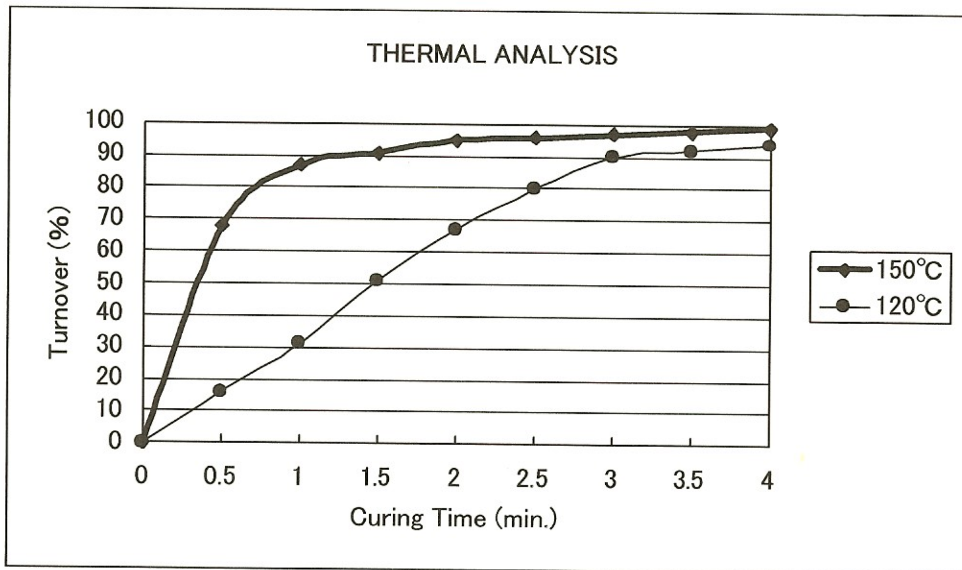
II) RECOMMENDED CURING PROFILE



In a case that large devices are laid near or on the back of the dispensed adhesive, the great calorific capacity of these devices would absorb heat to consequently give rise to phenomenon that additional longer curing time are needed.

Ⅲ) CURING RATE AND ADHESIVE STRENGTH

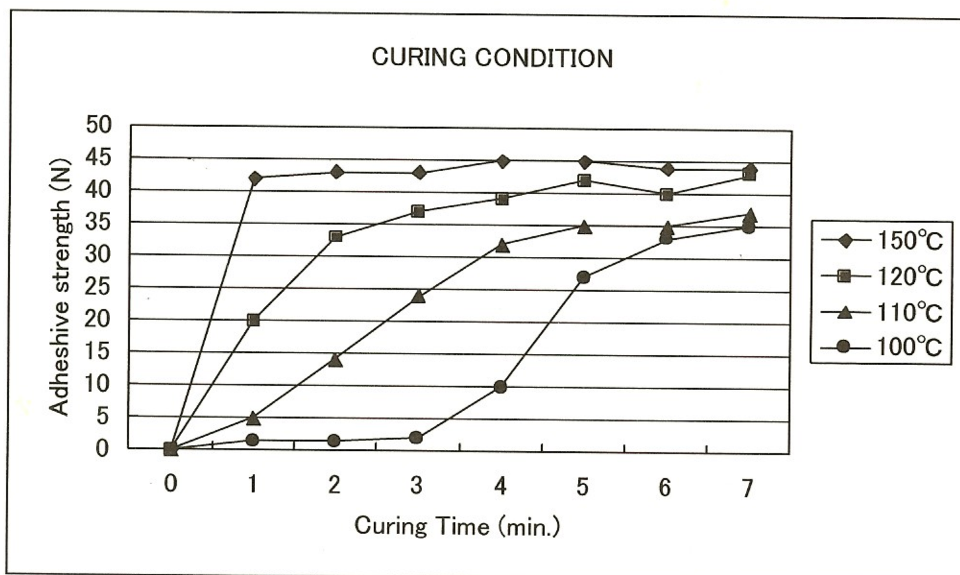
Thermal analysis : DSC: Differential Scanning Calorimetry



Ⅳ) CURING CONDITION AND ADHESIVE STRENGTH

The following graph shows the rate of adhesive strength developed with time at different temperature

Chip part : 2125C
Amount of adhesive : 0.20mg/chip



V) TIME LEFT UNDER R.T. AFTER DISPENSING AND ADHESIVE STRENGTH

PCB used for tests : CEM-3

Curing condition : Kept the PCB on a plate-heater set at 150 degrees C for 2mins.

Measurement of strength : Measured tensile strength, by push-pull gauge, at chip's major axis.

Test Method : After the PCB was adhesive-coated by a dispenser, left under the room temperature for a fixed time, loaded with 2125C chips, and given the above mentioned curing condition, adhesive strength was measured one hour later from the completion of curing.

Time (Left under R.T.)	Adhesive strength
Right after dispensing	29N (2. 97kg)
20mins. Later	29N (3. 03kg)
1hour later	29N (2. 95kg)
12 hours later	33N (3. 40kg)
24 hours later	32N (3. 28kg)

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Technical Data No.8105-1/1

Adhesive for chip mounting machines

CURING AND RESISTIVITY FOR *Seal-glo NE8800K*

Curing condition	No.	Measuring Value	Average	Average
Before curing	①	$1.5\times10^{8}\Omega$ $1.6\times10^{8}\Omega$ $1.6\times10^{8}\Omega$ $1.5\times10^{8}\Omega$	$1.6\times10^{8}\Omega$	$1.6\times10^{8}\Omega$
	②	$1.5\times10^{8}\Omega$ $1.7\times10^{8}\Omega$ $1.7\times10^{8}\Omega$ $1.3\times10^{8}\Omega$	$1.6\times10^{8}\Omega$	
150℃×75 secs.	③	$1.5\times10^{12}\Omega$ $5.2\times10^{12}\Omega$ $7.3\times10^{12}\Omega$ $2.0\times10^{13}\Omega$	$1.2\times10^{13}\Omega$	$1.7\times10^{13}\Omega$
	④	$1.1\times10^{13}\Omega$ $1.6\times10^{13}\Omega$ $3.0\times10^{13}\Omega$ $8.5\times10^{13}\Omega$	$2.1\times10^{13}\Omega$	
150℃×90 secs.	⑤	$2.4\times10^{14}\Omega$ $2.6\times10^{14}\Omega$ $1.4\times10^{14}\Omega$ $1.6\times10^{14}\Omega$	$2.0\times10^{14}\Omega$	$1.7\times10^{14}\Omega$
	⑥	$7.0\times10^{13}\Omega$ $1.5\times10^{14}\Omega$ $1.5\times10^{14}\Omega$ $2.0\times10^{14}\Omega$	$1.4\times10^{14}\Omega$	
150℃×120 secs.	⑦	$6.0\times10^{14}\Omega$ $5.0\times10^{14}\Omega$ $7.0\times10^{14}\Omega$ $3.0\times10^{14}\Omega$	$5.3\times10^{14}\Omega$	$4.9\times10^{14}\Omega$
	⑧	$6.0\times10^{14}\Omega$ $5.0\times10^{14}\Omega$ $4.0\times10^{14}\Omega$ $2.6\times10^{14}\Omega$	$4.4\times10^{14}\Omega$	
150℃×180 secs.	⑨	$8.0\times10^{14}\Omega$ $9.0\times10^{14}\Omega$ $4.0\times10^{14}\Omega$ $6.0\times10^{14}\Omega$	$6.8\times10^{14}\Omega$	$5.2\times10^{14}\Omega$
	⑩	$4.0\times10^{14}\Omega$ $5.0\times10^{14}\Omega$ $3.0\times10^{14}\Omega$ $2.2\times10^{14}\Omega$	$3.6\times10^{14}\Omega$	

P.C.Board applied for test:GE-4 Combs pattern electrode JIS Z3197 type Ⅱ
Curing condition:Kept the PCB on a plate-heater set at 150 degrees C for fixed time.
Measuring method:Measured by High resistivity meter SM-10E manufactured by
Toowa Denpa Kougyo Co., Ltd. at 100V

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Technical Data No.8106-1/1

Adhesive for chip mounting machines

THE PRESERVATION OF *Seal- glo NE8800K*

I) The variance of viscosity at 5℃

(the measuring temperature is 25℃)

	Base	1month	3months	6months	8months	12months
Viscosity	3.19	3.10	3.22	3.35	3.32	3.40
TI	6.4	6.2	6.2	6.0	5.8	5.5

II) The variance of viscosity at 25℃

(the measuring temperature is 25℃)

	Base	1month	3months	6months	8months	12months
Viscosity	3.19	3.22	3.34	2.77	2.80	2.94
TI	6.4	5.9	5.7	5.3	5.2	5.0

III) The variance of viscosity at 40℃

(the measuring temperature is 25℃)

	Base	1day	7days	14days	20days	30days	40days
Viscosity	3.22	3.05	2.95	2.84	2.90	3.41	3.85
TI	6.4	6.3	6.0	5.9	5.7	5.4	—

IV) The variance of viscosity at 50℃

(the measuring temperature is 25℃)

	Base	1day	2days	3days	4days	5days
Viscosity	3.13	2.88	3.48	4.48		
TI	6.3	5.9	5.5	—		

TI = Ratio the viscosity at 1rpm to the viscosity at 10rpm
At TI "—" shows TI is estimated to be below 4.0.

[Warning] In case *Seal-glo NE8800K* is exposed to higher temperature than 40℃, at the first stage it shows a tendency to slumping owing to the reduction of the degree of thixotropy, and finally tends to initiate the curing and increase its viscosity.
We do advise therefore to preserve adhesives in a refrigerator keeping the temperature less than 10℃.

These characteristics are representative values, which we obtained by measurement in accordance with our evaluation method.

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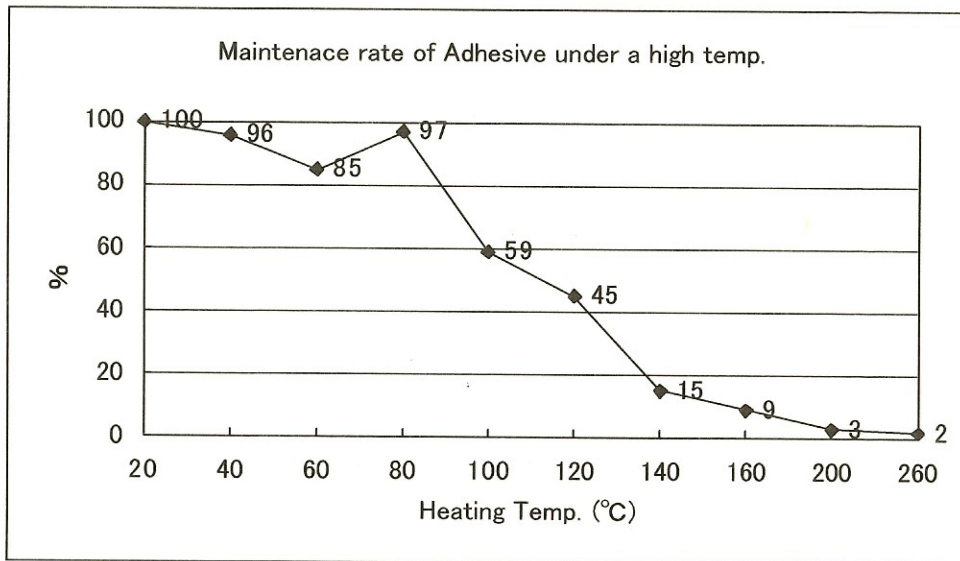
Technical Data No.8107-1/2

Adhesive for chip mounting machines

Seal-glo NE8800K DATA ON HEATING AND ADHESION

I) THE VARIANCE OF ADHESIVE STRENGTH UNDER HIGH TEMPERATURE

PCB applied for tests:CEM-3
Chip & amount of adhesive applied for tests:2125C & 0.20mg
Curing condition:Put the chip mounting PCB in hot-air oven and kept it there for 60sec. after the temperature of PCB has gone up to 150℃.
Measuring method: Put the chip mounting PCB on the plate heater set at fixed temperature and adhesive strength is measured after 20sec.



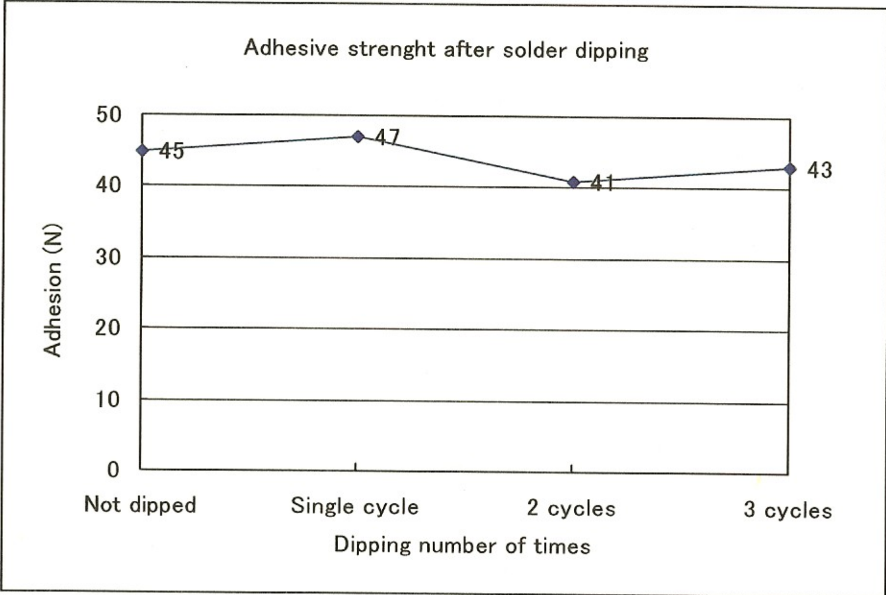
II) SOLDER HEAT RESISTANCE TESTS

PCB applied for tests:CEM-3
Chip & amount of adhesive applied for tests:2125C & 0.20mg
Curing condition: Put the chip mounting PCB in hot-air oven and kept it there for 60sec. after the temperature of PCB has gone up to 150℃.
Measuring method:

The following procedure was performed.

1. Four 2125C-mounted PCBs are prepared.
2. One PCB is first measured in its adhesive strength under the room temperature. (Not dipped)
3. Secondly, another PCB is dipped into a 260℃-set solder bath for 10 secs., taken out therefrom, and exposed for 30 mins. under the room temperature to get cooled.
   A series of the operation is regarded as a cyclic operation, and the PCB cooled down is measured in its adhesive strength under the room temperature. (Single cycle)
4. Such cyclical operation is conducted for 2 times to the third PCB, and its adhesive strength is measured under the same condition. (2 cycles)

5.The same cyclical operation is performed for 3 times to the fourth PCB, and its adhesive strength is measured too under the same condition. (3 cycles)



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Technical Data No:8109-1/1

Adhesive for chip mounting machines

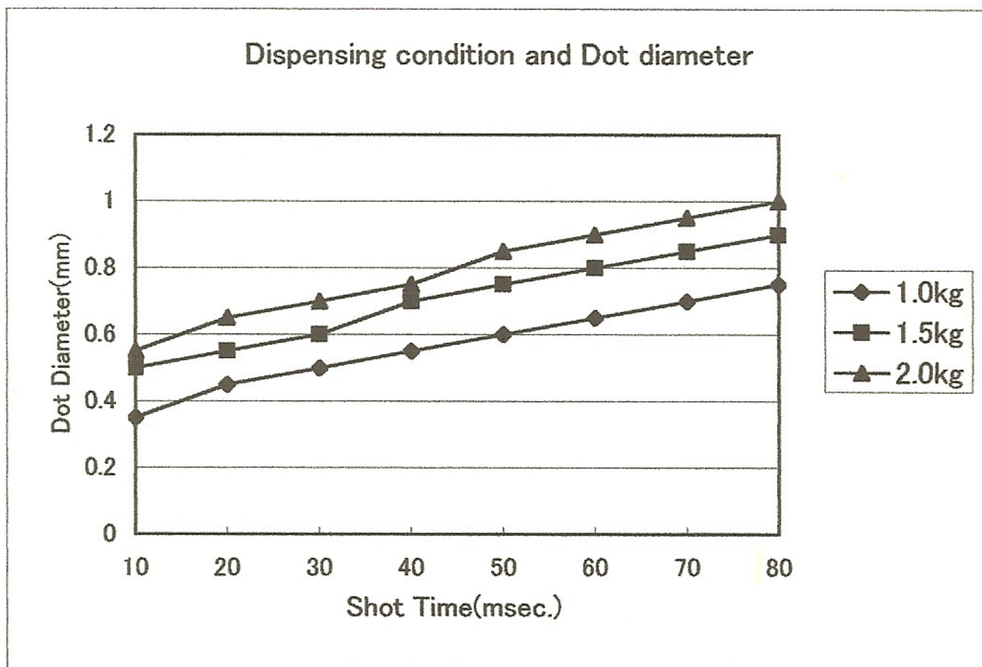
DISPENSING CONDITION FOR *Seal-glo NE8800K*

The diameter of dots that were dispensed with various conditions was measured.

Using needle: a needle attached 2 needles with inner diameter of 0.5mm

Adhesive temperature in a syringe: 22-23℃

Pressure (kg)	Shot Time (msec.) 10	20	30	40	50	60	70	80
1.0kg	0.35	0.45	0.5	0.55	0.6	0.65	0.7	0.75
1.5kg	0.5	0.55	0.6	0.7	0.75	0.8	0.85	0.9
2.0kg	0.55	0.65	0.7	0.75	0.85	0.9	0.95	1



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