

**Pb-FREE SOLDER PASTE TLF-SERIES**  
***LFSOLDER TLF-204-NH(20-36)***

*LFSOLDER TLF-204-NH(20-36)* is the Pb-free and Halogen-free solder paste which it used spherical Pb-free solder powder and the halogen-free flux. Also, after reflow, the flux residue of this paste becomes with halogen free, because it does not include halogen. As the paste contains no Pb, it will largely contributable to the protection of global environment. Furthermore, excellent reliability can be obtained with the flux without washing.

### 1. Outstanding Features

- 1) Pb-free (Sn/Ag/Cu series) solder alloy is used.
- 2) Halogen-free flux is used.
- 3) Stable printability is obtained with little change in viscosity during continuous printing.
- 4) Having a good solderability even in air reflow.
- 5) Excellent solderability can be attained for a high peak temperature.
- 6) Superior reliability is provided by no washing.

### 2. Characteristics

The characteristics of *LFSOLDER TLF-204-NH(20-36)* is shown in Table 1 and Table 2.

Table 1 - The characteristics of *LFSOLDER TLF-204-NH(20-36)*

Items	Characteristics	Test methods
Alloy composition	Sn 96.5 / Ag 3.0/ Cu 0.5	JIS Z 3282 (1999)
Melting point	216~220°C	DSC measurement
Particle size of solder powder	20~36μm	Laser diffraction method
Shape of solder powder	Spherical	Annex 1 to JIS Z 3284 (1994)
Flux content	11.9%	JIS Z 3284 (1994)
Chlorine content*	0.0%	JIS Z 3197 (1999)
Viscosity	180 Pa·s	Annex 6 to JIS Z 3284 (1994) Viscometer type PCU-205 manufactured by Malcom, at 25°C

\* Inspected the flux itself only

Table 2 - The characteristics of LFSOLDER TLF-204-NH(20-36)

Items	Characteristics	Test methods
Water solution resistance test	More than $1 \times 10^4 \Omega \cdot \text{cm}$	JIS Z 3197 (1999)
Insulation resistance test	More than $1 \times 10^9 \Omega$	Board type 2, Annex 3 to JIS Z 3284 (1994) Reflow: By reflow soldering system.
Preheat slump test	Less than 0.20mm	Print the paste on ceramics board and heat for 60 seconds at 150°C. Measure slumping width from before and after heating. STD-092b※
Solder ball test	Solder balls seldom occur.	Print the paste on ceramics board. After melting and heating, observe with a microscope of 50 times. STD-009e※
Solder spread test	More than 70%	JIS Z 3197 (1986) 6.10
Copper plate corrosion test	No corrosion	JIS Z 3197 (1986) 6.6.1
Tackiness test of residue	Pass	Annex 12 to JIS Z 3284(1994)

※ The standard test method of our company

(The written characteristics is not a guarantee value.)

### 3. Quality Guarantee Period

The quality guarantee period is 180 days after manufacture under the storage condition below 10°C with sealed.

### 4. Product Packaging Units

The standard packing unit is 500g for LFSOLDER TLF-204-NH(20-36)

## 5. Cautions for Use

### (1) Stirring of Solder Paste

#### (1.1) Manual Stirring

Thoroughly stir solder paste stored in refrigerators with spatula or the like after returning to room temperature without fail (It takes about one to two hours if left standing at 25 °C). If the seal is broken the paste will absorb moisture to cause solder balls.

#### (1.2) In the Case of Using Automatic Stirring Apparatus

An automatic stirring apparatus is utilized at times to use solder paste stored in refrigerators by returning it to room temperature in a short period of time. Even if such automatic stirring apparatus is used, no change will occur to the characteristics of the solder paste. With the lapse of stirring time, the temperature of solder paste will rise as shown in Fig.1: If the stirring time is lengthened, it will lead to the possibility of throwing solder paste with temperature higher than the working environment onto boards and thus causing bleeding during printing. So, be careful. Conduct adequate test beforehand since the stirring time will vary according to the specifications of apparatus, ambient temperature, and other conditions. (In case of using solder softener SS-1, appropriate stirring time will be about 20 minutes).

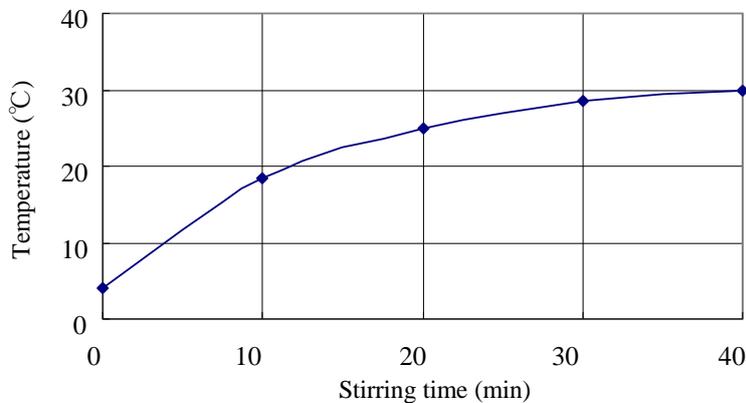


Fig.1 - Stirring time and temperature rise of solder paste when using automatic stirring apparatus

Apparatus: Solder softener SS-1 manufactured by Malcom

(2) Printing condition

Printing conditions recommended for LFSOLDER TLF-204-NH(20-36) is shown in Table 3:

Table 3 - Printing conditions recommended

Items	Setting range
Stencil	Laser machined, manufactured by additive (or those with flat opening side)
Squeegee	Metal
Squeegee angle	50~70 °
Squeegee speed	20~80mm/s
Printing pressure	100~200kPa

(3) Parts Mounting Time

Mount the parts within 24 hours after printing the solder paste. If left standing for a long time after printing, the surface of solder paste will dry up to cause mount error of parts.

(4) Reflow Conditions

Recommended temperature profile of air reflow is shown in Fig.2.

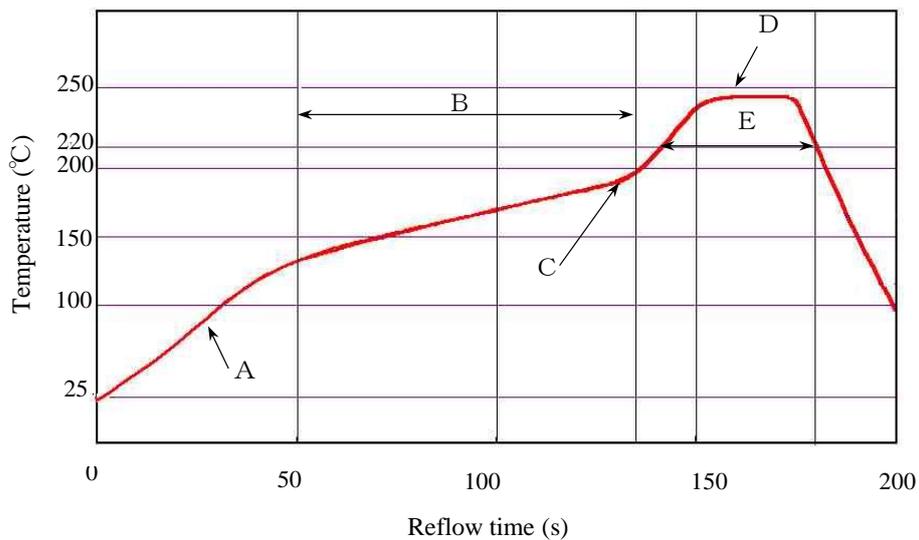


Fig.2 - Temperature profile of air reflow

[Precautions]

1) Preheat

- Set the temperature rising speed A at a rate of 1~3°C/s. Careful about rapid temperature rise in preheat zone as it may cause excessive slumping of the solder paste.
- Appropriate preheat time B will be from 60 to 100 seconds. If the preheat is insufficient, rather large solder balls tend to be generated. Conversely, if performed excessively, fine balls and large balls will generate in clusters at a time.
- Appropriate preheat ending temperature C will be from 150 to 190°C. If the temperature is too low, non-melting tends to be caused in the area with large heat capacity after reflow.

2) Heating

- Careful about sudden rise in temperature as it may worsen the slump of solder paste.
- Set the peak temperature D in the range from 235 to 245°C.
- Adjust the melting time that the time over 220°C,E, will be from 20 to 60 seconds.

3) Cooling

- Careful about slow cooling as it may cause the positional shift of parts and decline in joining strength at times.

※ Perform adequate test in advance as the reflow temperature profile will vary according to the conditions of parts and boards, and the specifications of the reflow furnace.

## 6. Cautions of Safety and Sanitation

- 1) Physiological interaction varies by individuals. As a prudent policy, therefore, care, should be exercised not to inhale gas or fume of solvent emitted during operations and not to have your skin exposed (especially mucous membrane and other parts vulnerable to stimuli) for a long time.
- 2) This paste contains an organic solvent, but it is not flammable.
- 3) If the paste sticks to the skin, wipe it off with ethanol and the like, and wash thoroughly with soapy water.

\*The physical chemistry-character among written contents etc. is not a guarantee value. The evaluation of danger and noxiousness is based on material, information, and the data, etc. which can be acquired now. However, it is not because all material was covered and not handled enough, please. As for notes, it is the one intended for usual handling. Special handling is not assumed. Please observe the restriction of related various regulations, and use after executing suitable safety measures for the usage.

Before starting using our paste, please kindly conduct sufficient examination on manufacturing process and credibility. We will not guarantee your product in case a problem occurs to your product while using our product.

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