



TECHNICAL DATA

Pb-FREE SOLDER PASTE TLF-SERIES ***LFSOLDER TLF-801-17***

1.Introduction

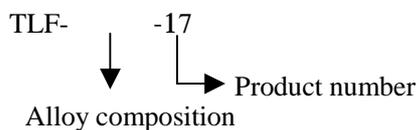
LFSOLDER TLF-801-17 is composed of Pb-free spherical solder powder with very low oxide content and a highly reliable flux. As the paste contains no lead it will contribute to the protection of the global environment. The melting point of this alloy is close to the Sn/Pb eutectic solder, because this solder paste is composed of Sn/Ag/Bi/In solder alloy. In result, current reflow conditions can be applied.

2.Outstanding features

- Pb-free (Sn/Ag/Bi/In series) solder alloy is used.
- Having a good wettability and solderability.
- The current reflow conditions can be applied.
- Solder balls seldom occur.
- Excellent printability with fine patterns can be obtained.
- Stable printability is obtained with little change in viscosity during continuous printing.

3.Outline of products

(1)Product markings



(2)Alloy composition

	Melting point (Start of melting/ end of melting)	Symbol
Sn88.0/Ag3.5/Bi0.5/In8.0	195/209	801

(3)Particle size of solder powder.

20-41 μm

(4)Solder powder content

88.5 %

(5)Viscosity

220 Pa·s

(6)Packaging unit

500 g, 1 kg

(7)Quality guarantee period

90 days after manufacture if stored, tightly sealed, at a temperature below 10 °C.

4.Physical properties

(1)Appearance of solder powder

Fig.1 shows the appearance of the solder powder taken by SEM photography.

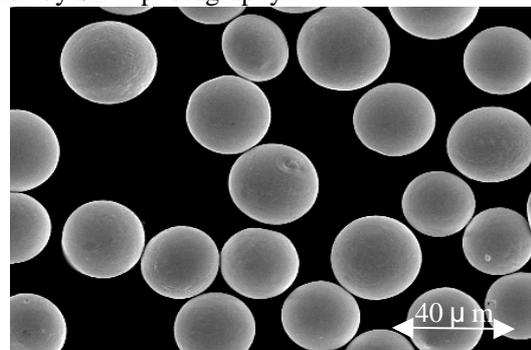


Fig.1 SEM photograph of solder powder

(2) Particle size distribution of solder powder

Shown in Fig.2 is the particle size distribution of solder powder measured in accordance with JIS Z 3284(1994):

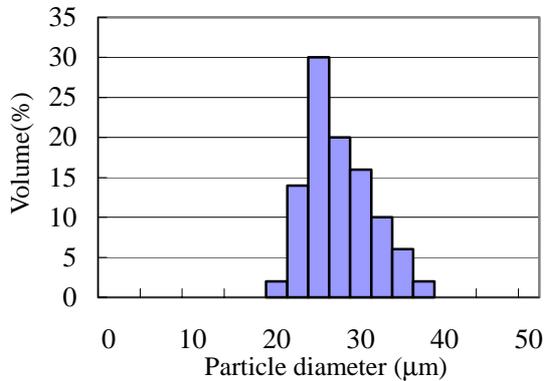


Fig.2 Particle size distribution of solder powder by laser diffraction method
Measuring equipment: LS-230 as manufactured by Coulter

(3) Viscosity characteristics

Table 1 shows the thixotropy index as measured in accordance with JIS Z 3284(1994):

Item	Measurement
Thixotropy index	0.58

(4) Temperature dependency

The relationship between temperature and viscosity is shown in Fig.3. The viscosity changes with the temperature and as a result the printability. Therefore it is important to control the temperature of the working environment.

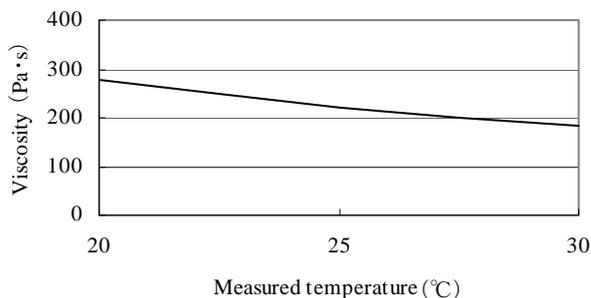


Fig.3 Relationship between temperature and viscosity
Viscometer: Type PCU manufactured by Malcom

(5) Slump

If the slump of the solder paste is too great during printing and/or the pre-heating this will tend to cause solder balls and bridging. Fig.4 shows the appearance of the solder paste after printing and after pre-heating, tested in accordance with JIS Z 3284(1994):

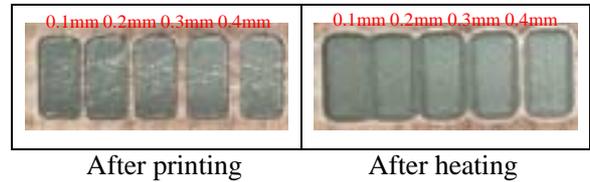


Fig.4 Slump after printing and after heating

Metal mask: 0.2 mm t
Slit size : 0.1, 0.2, 0.3mm
(from the left side)
Heating conditions: 150 , 1min

(6) Tackiness

Fig.5 shows the change in tackiness force with shelf time in accordance with JIS Z 3284(1994):

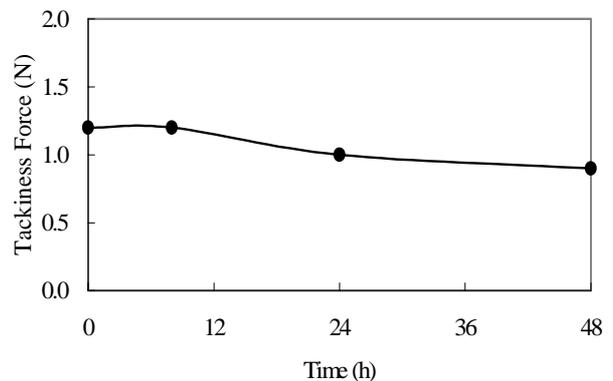


Fig.5 Change in tackiness force

Measuring device: Tackiness tester, TK-1,
manufactured by Malcom
Press speed: 2.0 mm/s
Press force: 0.49 N
Peeling speed: 10.0 mm/s
Press time: 0.2s

5. Reliability

(1) Insulation resistance test

The change in insulation resistance measured in accordance with JIS Z 3284(1994) is shown in Fig.6. It shows good insulation characteristics, with practically no decline in insulation resistance.

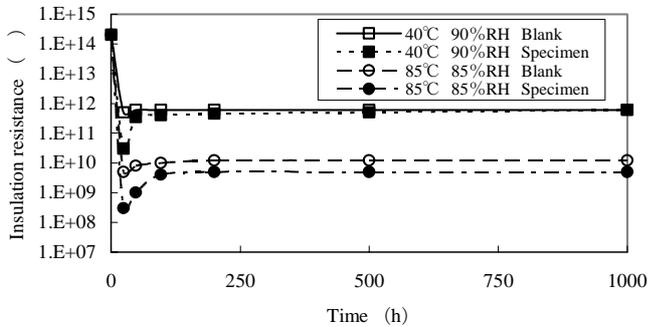


Fig.6 Change in insulation resistance in accordance with JIS Z 3284(1994):

Board: JIS comb type electrode board, type 2.
printed with solder paste and re-flowed are used as test boards.

Measurement: Inside tank, measuring voltage DC100 V

(2) Migration test

The results of migration test measured in accordance with JIS Z 3284(1994) are shown in Fig.7. Neither the occurrence of migration, nor the occurrence of corrosion is seen, with a decline in insulation resistance.

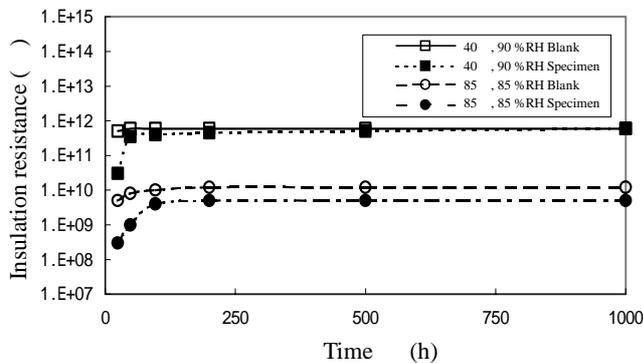


Fig.7 Migration test in accordance with JIS Z 3284(1994):

Board: JIS comb type electrode board, type 2.
printed with solder paste and re-flowed are used as test boards.

Voltage: DC 50 V

Measurement: Inside tank, measuring voltage DC100 V

6. Printability

(1) Appropriate printing conditions

Squeegee material: Metal, Urethane

Squeegee hardness: 80-90° (Urethane)

Printing speed: 20-80mm/s

(2) Continuous printability

Fig.8 shows the conditions of continuous printing on the slits at 0.4 mm pitch. An excellent printability is shown from the beginning to the 50th sheet with no sign of bleeding.

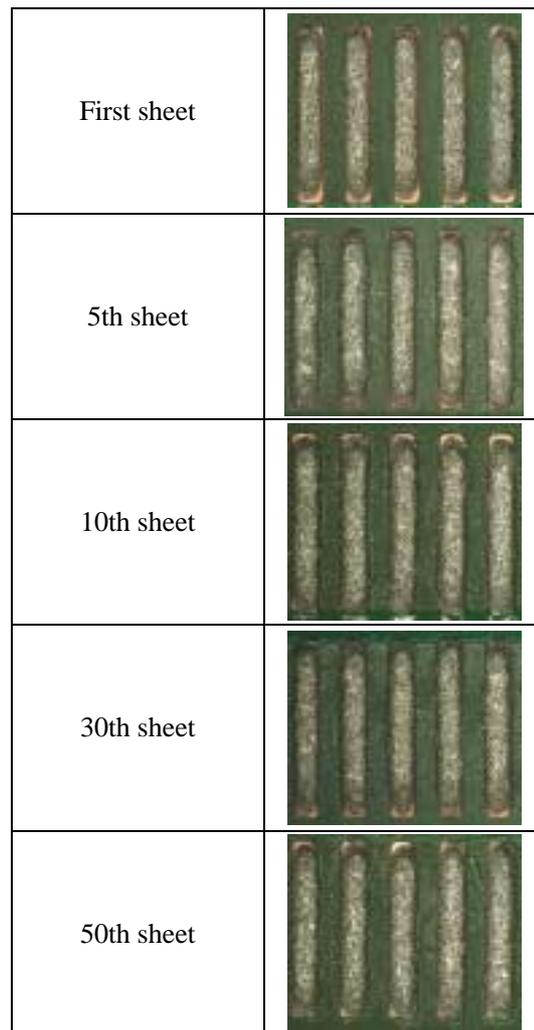


Fig.8 Continuous printability at 0.4mm pitch

No wiping of plate back

Squeegee: Metal (SUS)

Printing speed: 30 mm/s

Metal mask: 0.15mmt

Environment: 23-25 (40-60 %RH)

(3) Change in viscosity during continuous printing

The viscosity of solder paste changes noticeably according to the type of solder paste and the conditions during printing, thus influencing the printability. Therefore, the change in viscosity at the time of rolling LFSOLDER TLF-801-17 on top of the metal mask, is measured every 250th sheets, and is shown in Fig.9. It shows an excellent stability, with practically no change in viscosity during continuous printing.

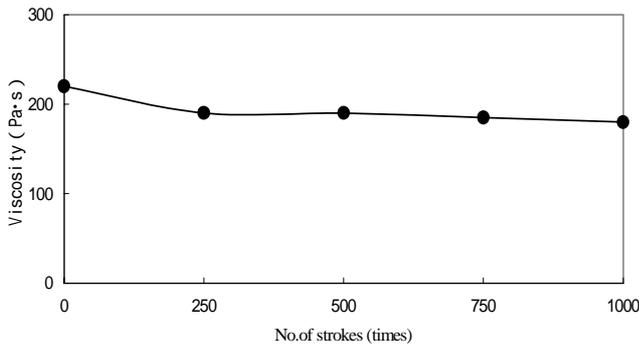


Fig.9 Change in viscosity during continuous printing

Squeegee: Metal (SUS)
 Printing speed: 30 mm/s
 Printing pressure: 150 kPa
 Viscometer: Type PCU manufactured by Malcom
 Environment: 23-25 (40-60%RH)

7.Storage stability

The change in viscosity during storage at a temperature of 10 is shown in Fig.10. It can be seen that the product is excellent in stability with no change in viscosity from the time of manufacture.

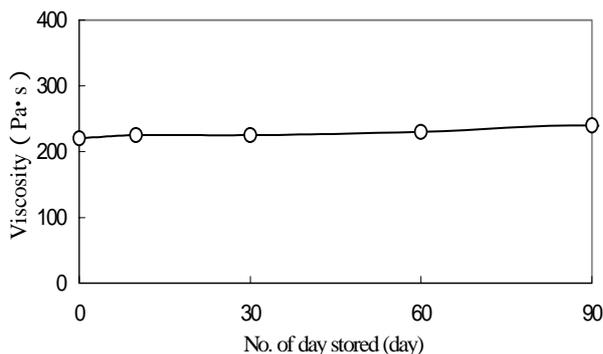


Fig.10 Change in viscosity during storage

Temperature: at 10
 Viscometer: Type PCU manufactured by Malcom

8.Recommended reflow profile

Fig.11 shows the recommended temperature profile for air reflow:

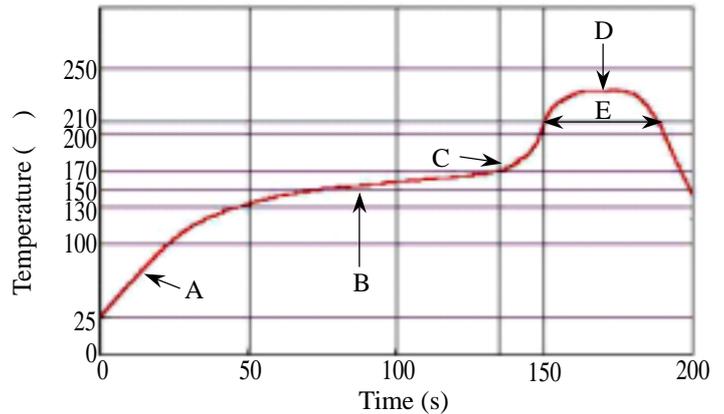


Fig.11 Temperature profile of air reflow

a) Preheat

Set the temperature rising speed A at a rate of 1-3 per second. Rapid temperature raising in pre-heat zone tends to cause solder balls.

It will be appropriate if pre-heat time B were set in the range from 60 to 120 seconds. If pre-heat is insufficient, rather large solder balls tend to be caused. Conversely, if it is excessive, fine balls and large balls are caused in clusters.

Pre-heat ending temperature C would be appropriate if it were set in the range from 150 to 170 . If the temperature is too low, non-melting tends to be caused often after reflow.

b) Heating

If the temperature rise is too fast it may cause excessive slump of the solder paste. Set the peak temperature D in the range from 220 to 235 .

Adjust the melting time, the time at over 210 , E 30 seconds over.

c) 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.

9.Cautions for storage and use

- a) Store in refrigerator to maintain characteristics of LFSOLDER TLF-801-17.
- b) Break the seal after returning to room temperature without fail, before use. In case of 1 kg container, it will take approximately three to four hours at 25 .
- c) Physiological interaction varies by individuals. As a prudent policy, therefore, care, should be exercised not to inhale gas of 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.
- d) This paste is contains the organic solvent, but it is no flammable.
- e) If the paste sticks to the skin, wipe it off with ethanol and the like, and wash thoroughly with soapy water.

Please refer to MSDS before you use this solder paste.

*The Flux ingredients in the paste contain nonionic halogen based activator.

The physical chemistry-character among written contents etc. is not a guarantee value. The evaluation of danger and noxiousness is based and makes material, information, and the data, etc. which can be acquired now. However, it is not because all material was covered and note handling 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 using it in your company, it is related with process conditions or reliability. Please conduct sufficient examination surely performed

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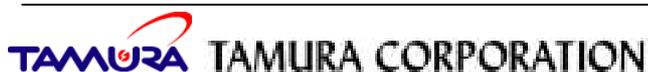
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