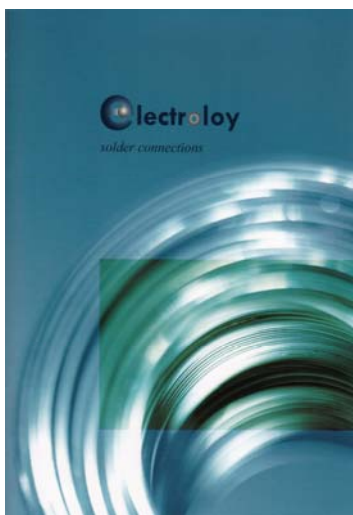




LF-300B series of LEAD FREE BAR

雅拓萊 LF-300B系列无铅锡条

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Disclaimer: 更改声明

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Since the age of Industrialization, Lead (Pb) has successfully been used in the manufacture of electrical and electronic equipment. But in recent years, studies have shown that if discarded lead-based electronic products continue to fill up landfill sites, it will lead to environmental catastrophe. Be it legislative, environmental, public sentiments or market drivers, Pb bearing commercial products – electronics will have to go!

自工业化时代开始，铅已成功的被用于电器和电子设备的制造。但近年来，研究显示如果弃置的含铅电子产品继续的填满土地，会导致环境受污染。在立法、环境、公众的要求或市场的驱动下，含铅的电子产品必将被取代。

The alternative material for making electronic interconnections is 'Pb Free' Solder, which is on the ever increasing demand since. This is a tight timescale for any manufacturing transition to the new lead-free soldering technologies, and its immediate actions are starting as soon as possible to meet the requirements.

可供替代制造电子相关材料的是无铅焊锡，正在不断的增加需求中。制造工艺过渡到新的无铅焊接工艺，有一个紧迫的时间表，必须尽快的采取行动以达到无铅时代的要求。

At Electroloy, we are capable to offer custom alloy development for specific temperature requirements and for other special applications. Or we can provide an alloy for your specific application that will meet your requirements.

我们雅拓莱公司有能力提供特定温度要求和特别用途的合金。我们也能提供顾客特定用途的合金以达到顾客的要求。



We have included evaluations performed on the various Pb Free alloys for your reference.

以下包括各种无铅合金的性能，以供参考。

High Purity Tin 高纯度锡

Pure Tin Code 纯锡编号	Purity % 纯度%	Melting Point (°C) 熔点 (°C)	Remarks 备注	Patent 专利
LF- 361B	Sn99.9%	232	Lead (Pb) Max. 0.050%	No
LF- 362B	Sn99.99%	232	Lead (Pb) Max. 0.005%	No

Low – Mid-Range Temperature Lead free alloys 低-中温范围无铅合金

Alloy Code 合金编号	Alloy Composition 合金	Solidus (°C) 固相线温度	Liquidus (°C) 液相线温度	Remarks 备注	Patent 专利
LF- 302B	Sn42/Bi58	138	EUTECTIC 共晶熔点	Low temperature alloy 低温合金	No
LF- 303B	Sn99.3/Cu0.7	227	EUTECTIC 共晶熔点	Mid-range temperature, Low cost in wave soldering 中温范围，成本低，波峰焊用	No
LF- 304B	Sn98/Ag2.0	221	226	Mid-range temperature, Simple binary alloy 中温范围，二元合金	No
LF- 305B	Sn96.5/Ag3.5	221	EUTECTIC 共晶熔点	Mid-range temperature, Simple binary alloy 中温范围，二元合金	No
LF- 306B	Sn97/Ag2.5/Cu0.5	217	221	Mid-range temperature, Cheaper to popular SAC 中温范围 较便宜于常用 SAC 合金	Yes US. 5527628
LF- 307B	Sn96.5/Ag3.0/Cu0.5	217	219	Mid-range temperature, Popular SAC alloy 中温范围，常用 SAC 合金	Yes US. 5527628
LF- 308B	Sn95.8/Ag3.5/Cu0.7	217	EUTECTIC 共晶熔点	Mid-range temperature, Popular SAC alloy 中温范围，常用 SAC 合金	Yes US. 5527628
LF- 309B	Sn96/Ag3.5/Cu0.5	217	219	Mid-range temperature, Popular SAC alloy 中温范围，常用 SAC 合金	Yes US. 5527628
LF-315B	Sn99/Ag0.3/Cu0.7	217	227	Mid-range temperature, Cheaper to popular SAC 中温范围 较便宜于常用 SAC 合金	Yes US. 5527628

Mid-Range Temperature Lead free alloys 中温范围无铅合金

Alloy Code 合金编号	Alloy Composition 合金	Solidus (°C) 固相线温度	Liquidus (°C) 液相线温度	Remarks 备注	Patent 专利
LF- 801B	Sn99.3/Cu0.7+Ni	227	EUTECTIC 共晶熔点	Mid-range temperature, Good alternative to SAC alloy for lead free soldering 中温范围 替代 SAC 合金于无铅焊接	Yes Nihon Superior MY-114845A 16212 ID 0010052 ZL 99800339.5
LF- 801BE (Top up bar)	Sn99.6/Cu0.4+Ni	227	230		
LF- 801HL	Sn99.3/Cu0.7+Ni	227	EUTECTIC 共晶熔点		
LF-801HLE (Top up bar)	Sn99.6/Cu0.4+Ni	227	230		
SN100C*	Sn99.3/Cu0.6/Ni+Ge	227	EUTECTIC 共晶熔点		
SN100Ce* (Top up bar)	Sn99/Cu/Ni+Ge (Low copper)	227	230		
SN100CL*	Sn99.3/Cu0.6/Ni+Ge	227	EUTECTIC 共晶熔点		
SN100CLe* (Top up bar)	Sn99/Cu/Ni+Ge (Low copper)	227	230		

* FCT Asia is in license agreement with Nihon Superior for SN100C

High Temperature Lead free alloys 高温无铅合金

Alloy Code 合金编号	Alloy Composition 合金	Solidus (°C) 固相线温度	Liquidus (°C) 液相线温度	Remarks 备注	Patent 专利
LF- 331B	Sn95/Sb5.0	235	240	High temperature alloy 高温合金	No
LF- 332B	Sn98/Cu2.0	227	280	High temperature alloy 高温合金	No
LF- 333B	Sn97/Cu3.0	227	300	High temperature alloy 高温合金	No

Electroloy's LF- 307B Lead free Bar 雅拓莱 LF- 307B 无铅锡条

LF-307B Pb-Free solder is a general purpose low dross solder alloy of high purity Sn, Ag & Cu, process via Electroloy's proprietary purification method. This alloy combination is favored by the electronic industry to replace the conventional Pb bearing solders.

LF-307B 无铅锡条，是雅拓莱以独特净化方式生产的一般用途、低渣、高纯度锡-银-铜合金。这种合金组合受到电子工业界的推崇，以之用来取代传统的含铅锡条。

LF-307B alloy combinations conform & exceed the impurities requirements of major international standards. These are the desired LF-307B bar qualities:-

LF-307B 合金组合的杂质含量符合甚至优于常用的国际标准。以下为 LF-307B 锡条的品质：

- o Good mechanical strength & electrical conductivity. 机械性能好，导电性好
- o Cost competitive. 成本具竞争力
- o Low melting point. 低熔点
- o Low dross. 低渣

Electroloy's LF- 315B Lead free Bar 雅拓莱 LF- 315B 无铅锡条

LF-315B Pb-Free solder is general purpose low dross solder alloy of Sn, Ag & Cu alloy combination design with the same soldering properties of the LF307B bar, but a cheaper alternatives to popular SAC bar.

LF-315B 无铅锡条也是雅拓莱一般用途、低渣锡-银-铜合金组合。这种合金组合被设计为拥有与LF-307B 无铅锡条同等的焊接性能，同时相比流行SAC 锡条更便宜。

LF-315B alloy combinations conform & exceed the impurities requirements of major international standards. These are the desired LF-315B bar qualities:-

LF-315B 合金组合的杂质含量要求符合并优于常用的国际标准。以下为 LF-315B 锡条的品质：

- o Good Wetting 优良的流动性
- o Good through hole fill 优良的通孔填充
- o Minimal hot tear 最小化的热撕裂
- o Comparable reliability to SAC 与 SAC 可比的可靠性能
- o Low Cost 低成本

Electroloy's LF- 801B Lead free Bar 雅拓莱 LF- 801B 无铅锡条

LF-801B was developed to offer a technically superior and more economical option to other lead free alloys. This nickel stabilized tin/copper alloy gives bridge-free wave soldering at temperatures normally used with tin/lead alloys.

LF-801B 被开发为一种相比其他无铅合金拥有更高的技术水平和更经济的合金。在用于普通锡-铅合金的温度下，这种锡-铜-镍合金可以提供出无桥波峰焊接。

The patented addition of nickel to the tin-copper eutectic offers the following advantages:

已有专利的加镍于锡-铜共晶具有下列好处：

- o Low cost lead free alloy 低成本无铅合金
- o Low dross formation 低渣
- o Bright, smooth solder joints that is free from gross micro cracks 光滑焊点，无裂痕
- o Good through hole penetration 好的穿孔能力
- o Low rate of copper leaching 铜的溶出速度低
- o Less aggressive on stainless steel & other solder pot materials 对不锈钢和其他焊锡锅材料腐蚀作用低
- o Easy to maintain alloy composition 容易保持合金成份

SN100C & SN100CL Lead free Bar 无铅锡条

Electroloy has entered into an agreement with FCT Asia Pte Limited to manufacture SN100CL solder alloy with patent license from Nihon Superior.

雅拓莱已经与 FCT 亚洲有限公司签署生产基于 Nihon Superior 有关专利的 SN100CL 的协议。

SN100CL is a lead-free solder containing tin, copper, nickel and other proprietary elements that make this alloy suitable for Solder wave & Hot Air Solder Leveling (HASL) process. All of the final finishes available in the market today have both their merits and demerits. Many in the PCB industry are concerned about switching from HASL to a less forgiving final finish as they transit to the up and coming lead free era.

SN100CL 是一种含有锡，铜，镍和其它独特元素的无铅焊料；这些特有的成份使其适用于波峰焊和热风焊料整平（HASL）工艺。在现今的市场上，所有的最后处理有其优点和缺点。在来临的从有铅到无铅焊料时代的转变期，PCB 工业里有很多人在关注从 HASL 到更严格的最后处理，

The SN100CL alloy use in the HASL process should arise these concerns.

在 HASL 加工处理过程里使用的 SN100CL 应注意这些要点。

The patented addition of nickel to the tin-copper eutectic offers the following advantages:

已获得注册专利的锡铜共晶中加入镍，锆元素的方法可以提供如下优点：

- o Low cost lead free alloy 低成本无铅合金
- o Low dross than other lead free alloy 相比其它无铅合金更低的残渣
- o Excellent fluidity with very uniform and flat surfaces 在整平的表面优良的流动性
- o Bridge free coating and fine pitch circuitry 无桥涂装和细距电路
- o Low copper erosion 减少的铜腐蚀
- o Good shelf life 优良的保质期
- o Minimal attack on stainless steel pot 对不锈钢炉减少的侵蚀
- o Close to eutectic temperature 接近于共晶熔点
- o Easy to manage alloy composition 易于管理合金成份
- o Compatible with both 63/37 and lead free final assembly 与 63/37 合金和无铅最终装配相一致

Electroloy's LF-307B / LF315B / LF-801B & SN100C Lead free bar specification

雅拓莱 LF-307B / LF315B / LF-801B & SN100C 无铅锡条规格

Element	Sn	Pb	Al	Sb	As	Bi	Cu	Fe	Zn	Ag	Cd	Au	Ni	In
LF-307B Spec	Rem.	Max. 0.050	Max. 0.005	Max. 0.050	Max. 0.030	Max. 0.050	0.4-0.6	Max. 0.010	Max. 0.003	2.8-3.2	Max. 0.002	Max. 0.050	Max. 0.010	Max. 0.050
LF-315B Spec	Rem.	Max. 0.050	Max. 0.005	Max. 0.050	Max. 0.030	Max. 0.050	0.6-0.8	Max. 0.010	Max. 0.003	0.2-0.4	Max. 0.002	Max. 0.050	Max. 0.010	Max. 0.050
LF-801B Spec	Rem.	Max. 0.050	Max. 0.002	Max. 0.050	Max. 0.030	Max. 0.030	0.5-0.7	Max. 0.020	Max. 0.002	Max. 0.050	Max. 0.002	Max. 0.050	Max. 0.100	Max. 0.100
SN100C SN100CL Spec	Rem.	Max. 0.050	Max. 0.002	Max. 0.050	Max. 0.030	Max. 0.030	0.6-0.7	Max. 0.020	Max. 0.002	Max. 0.050	Max. 0.002	-	Max. 0.100	-

Typical analysis for contaminants level (%) on Electroloy's LF-362B High Purity Tin bar

雅拓莱 LF-362B 高纯度锡条杂质(%)的典型分析化验

Element	Sn	Pb	Al	Sb	As	Bi	Cu	Fe	Zn	Ag	Cd	Au	Ni
LF-362B Spec EL-3020HP	Rem.	Max. 0.005	Max. 0.001	Max. 0.005	Max. 0.005	Max. 0.005	Max. 0.002	Max. 0.002	Max. 0.001	Max. 0.002	Max. 0.001	Max. 0.002	Max. 0.005
Typical LF- 362B	Rem.	0.0021	0.0005	0.0005	0.0006	0.0013	0.0003	0.0016	0.0001	0.0012	0.0001	0.0001	0.0001

Note : International Specification for Lead (Pb)铅成份国际规格--JIS Z 3282--- Max.0.100% & IPC J-STD-006B Amendment 1---Max.0.070%

Comparison of Lead Free alloy & Sn63/Pb37 characteristics

无铅合金 & Sn63/Pb37 性能比较

Characteristics 特性	LF-801B SN100C / SN100CL	LF-307B	LF-315B	63/37
Alloy composition 合金	Sn99.3/Cu0.7+Ni (+Ge for SN100C/CL)	Sn96.5/Ag3.0/Cu0.5	Sn99/Ag0.3/Cu0.7	Sn63/Pb37
Specific gravity 比重	7.4	7.4	7.3	8.4
Melting temperature ℃ 熔点	227	217 – 219	216-228	183
Tensile strength (MPa) 抗张强度	33	35	30	42
Elongation (%) 延展率	48	38	46	25
Electrical Resistivity 电阻系数 (μΩ-cm)	13	13	17	14.5

Recommended Process Parameters 推荐工艺参数

Recommended Process Setting 推荐工艺设定			
PROCESS PARAMETERS	LF-801B/ SN100C	LF-307B	LF-315B
工艺参数			
Solder Temperature 焊接温度	250°C - 260°C	245°C - 255°C	250°C - 260°C
Pre-heat 预热	100°C - 130°C	100°C - 130°C	100°C - 130°C
Conveyer Speed 传送速度	0.7m – 1.0m/min.	1.0m – 1.5m/min.	1.0m – 1.5m/min.
Contact Time 接触时间	3.0s – 4.0s	2.5s – 3.5s	2.0s – 3.0s

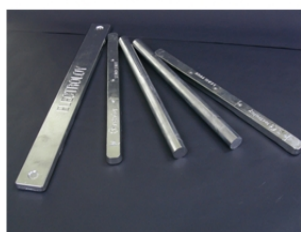
Electroloy's LF-801B / SN100C & LF-307B / LF-315B lead free bars are suitable for wave & dip soldering for electronic assemblies looking for alternative to Sn/Pb solders. The above parameters are only recommended setting which may require further fine tuning in relation to different types of machine used.

雅拓莱 LF-801B / SN100C 与 LF-307B / LF-315B 无铅锡条适用于电子组装波峰焊接和浸焊接，以取代含铅锡。

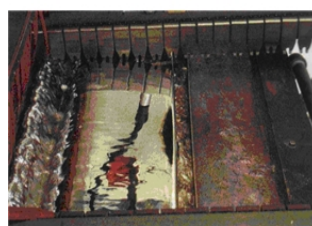
以上参数只是推荐设定，使用不同机器时，须进一步调整设定。

Application 应用

Lead Free Bars 无铅锡条



LF-801HL / SN100CL Bar 锡条



Wave process 波峰焊工艺



Dipping process 浸焊工艺



HASL process HASL 工艺

Physical Appearance 外观

Electroloy's LF-300B series bars are produce with either manually casted bars or extruded bars that exhibits a uniform colour. The brand & product code will be embossed onto it. Each bar weighs between 700 – 900 gms. We also produce larger bar size between 2 – 3 kg type for some special application.

雅拓莱 LF-300B 系列锡条分为铸条或呈现均匀光泽的挤条。锡条上印有品牌和产品编号。一根锡条重量为 700-900g，我们也生产较大锡条,2-3 kg. 供特别用途。

Packaging 包装

The standard packaging for Electroloy's LF-300B series bars is 20kg per box for both manually casted and extruded bars. For larger size bars, these will be palletized. All boxes will be traceable by their lot numbers.

雅拓莱 LF-300B 系列锡条的标准包装是铸条 20kg 一箱，挤条 20kg 一箱。较大锡条则放在卡板上。所有包装盒上都标有生产批号。

Storage 贮存

There is no shelf life for our LF-300B series bars. To minimize the bars from further oxidation, ensure that the packaging is not damaged & the bars are not exposed to dust & other foreign materials.

LF-300B 系列锡条没有期限规定，为了减少锡条受到氧化，确保包装不破损，锡条不曝露于灰尘和其他物质。

Delivery 交货

Each order can be shipped with the Certificate of Analysis for each lot.

交货同时附上分析证明书。

Material Safety Data Sheet 材料安全数据单

A MSDS for this product can be request from our Sales personnel.

产品的 MSDS 可向销售部索取。

Technical & Customer Service Support 技术 & 客户服务

For more information on our Lead free bars as well as our other products, please call, fax or email us. Our Sales Engineers will be most glad to answer your enquires as well as recommend the most suitable product for your application. Our Customer Service personnel are also available to provide you with our competitive quotation as well as expedite your orders & provide you with any assistance you may require.

欲知无铅锡条或我们其他的产品，请用电话、传真或电邮给我们。我们的销售工程师将很乐意的给予解答和介绍最适合您的用途的产品。我们的销售工程师会提供您具竞争力的报价，并尽快的交货和提供您所需要的协助。