CLAIMS

1. A process for the separation by fractional crystallisation (300) of a molten crude tin mixture (8) containing lead and silver, into a first silver-enriched liquid drain product (9) at the liquid end of the crystallisation step and a first tin-enriched product (10) at the crystal end of the crystallisation step, whereby the first silver-enriched liquid drain product (9) is consisting of, on a dry weight basis,

- at least 6.0%wt and at most 27.5%wt of lead,
- at least 72.5%wt and at most 91%wt of tin,
- at least 95.0%wt and at most 99.0%wt of lead and tin together,
- at least 0.75%wt and at most 4.50%wt of silver, and
- at least 0.24%wt of antimony

and which is optionally further containing, on the same basis

- at least 0.05%wt and at most 0.5%wt of arsenic,
- at least 0.05%wt and at most 0.6%wt of copper,
- at least 0.0030%wt and at most 0.0500%wt of nickel,
- at least 0.0010%wt and at most 0.40%wt of bismuth,
- at most 1.0%wt of iron, or
- at least 0.0005%wt and preferably at most 0.0500%wt of gold, the balance being impurities.

2. The process according to claim 1 wherein the crude tin mixture (8) comprises at least 0.1%wt and at most 7.0%wt of lead.

3. The process according to any one of the preceding claims wherein the lead concentration in the crude tin mixture (8) is at least 3.0 times the silver concentration in the crude tin mixture (8).

4. The process according to any one of the preceding claims wherein the crude tin mixture (8) is at least partially obtained as the first bottom product from a first distillation step (200) wherein lead (Pb) is removed from a molten solder mixture (6) by evaporation, thereby obtaining as overhead product a first concentrated lead stream (7).

5. The process according to any one of the preceding claims wherein the first tin-enriched product (10) is subjected to a second distillation step (400) separating off by evaporation primarily lead and

antimony from the first tin-enriched product (10), thereby producing as overhead product a second concentrated lead stream (12) and a second bottom product (13).

6. The process according to claim 5 wherein the second concentrated lead stream (12) is subjected to a third distillation step (600) separating off by evaporation primarily lead and antimony from the second concentrated lead stream (12), thereby producing as overhead product a third concentrated lead stream (21) and a third bottom product (22).

7. The process according to claim 6 further comprising the step (800) of removing at least one contaminant selected from the metals arsenic and tin from the third concentrated lead stream (21), thereby producing a purified hard lead stream as a hard lead product (28).

~~4.~~8. The process according to any one of claims 5-7 wherein the second bottom product (13) is further refined to obtain a high purity tin prime product (20).

9. The process according to any one of the preceding claims wherein the first silver-enriched liquid drain product (9) is subjected to a fourth distillation step wherein lead is removed by evaporation into a fourth concentrated lead stream as distillation overhead product, thereby producing a fourth distillation bottom product.

~~5.~~10. The process according to the preceding claim wherein the fourth concentrated lead stream is combined with the first concentrated lead stream (7) to obtain a fifth concentrated lead stream.

~~6.~~11. The process according to any one of~~the preceding~~ claims 9-10 wherein the fourth distillation bottom product is subjected to a fractional crystallisation step which produces a second silver-enriched drain product at the liquid end and a second tin-enriched product at the crystal end.

~~7.~~12. The process according to any one of ~~the preceding~~ claims 1 or 11, wherein the first silver-enriched liquid drain product (9) , when depending on claim 1, or the second silver-enriched liquid drain product, when depending on claim 11, is used as feed for being cast into at least one anode which is subjected to an electrorefining step for obtaining a cathode product rich in lead plus tin, and an anode slime rich in silver, preferably the

anode slime adhering to the used anode and being removed therefrom by mechanical means.

~~8. The process according to any one of claims 4-7 wherein the fourth concentrated lead stream is combined with the first concentrated lead stream (7) to obtain a fifth concentrated lead stream.~~

~~9.~~13. ~~-~~The process according to any one of claims 4, 9 or 10, ~~8~~ further comprising the step of removing at least one contaminant selected from the metals arsenic, tin and antimony from a concentrated lead stream selected from the first concentrated lead stream (7), when depending on claim 4, the fourth concentrated lead stream, when depending on claim 9, and the fifth concentrated lead stream, when depending on claim 10, to obtain a purified soft lead product (27).

~~10. The process according to any one of the preceding claims wherein the first tin-enriched product (10) is subjected to a second distillation step (400) separating off by evaporation primarily lead and antimony from the first tin-enriched product (10), thereby producing as overhead product a second concentrated lead stream (12) and a second bottom product (13).~~

~~11. The process according to claim 10 wherein the second concentrated lead stream (12) is subjected to a third distillation step (600) separating off by evaporation primarily lead and antimony from the second concentrated lead stream (12), thereby producing as overhead product a third concentrated lead stream (21) and a third bottom product (22).~~

~~12. The process according to claim 11 further comprising the step (800) of removing at least one contaminant selected from the metals arsenic and tin from the third concentrated lead stream (21), thereby producing a purified hard lead stream as a hard lead product (28).~~

~~13. The process according to any one of claims 10-12 wherein the second bottom product (13) is further refined to obtain a high purity tin prime product (20).~~

14. A metal composition (9) consisting of, on a dry weight basis,

- at least 6.0%wt and at most 27.5%wt of lead,

- at least 72.5%wt and at most 91%wt of tin,
- at least 95.0%wt and at most 99.0%wt of lead and tin together,
- at least 0.75%wt and at most 4.50%wt of silver, and
- at least 0.24%wt of antimony,

and which is optionally further containing, on the same basis

- at least 0.05%wt and at most 0.5%wt of arsenic,
- at least 0.05%wt and at most 0.6%wt of copper,
- at least 0.0030%wt and at most 0.0500%wt of nickel,
- at least 0.0010%wt and at most 0.40%wt of bismuth,
- at most 1.0%wt of iron, or
- at least 0.0005%wt and preferably at most 0.0500%wt of gold, the balance being impurities.