CLAIMS

1. A method for joining a first metal part (11) with a second metal part (12), the metal parts (11, 12) having a solidus temperature above 1000 ºC, the method comprising

- applying (201) a melting depressant composition (14) on a surface (15) of the first metal part (11), the melting depressant composition (14) comprising
    - a melting depressant component that comprises at least 25 wt% phosphorus and silicon for decreasing a melting temperature of the first metal part (11), and
    - optionally, a binder component for facilitating the applying (201) of the melting depressant composition (14) on the surface (15),
- bringing (202) the second metal part (12) into contact with the melting depressant composition (14) at a contact point (16) on said surface (15),
- heating (203) the first and second metal parts (11, 12) to a temperature above 1000ºC, said surface (15) of the first metal part (11) thereby melting such that a surface layer (21) of the first metal part (11) melts and, together with the melting depressant component, forms a melted metal layer (210) that is in contact with the second metal part (12) at the contact point (16), and
- allowing (204) the melted metal layer (210) to solidify and form a joint (25) at the contact point (16), the joint (25) comprising at least 50 wt% metal that, before the heating (203), was part of any of the first metal part (11) and the second metal part (12).

2. A method according to claim 1, wherein the phosphorus originates from a phosphorus compound selected from at least any of the following compounds: Mn_xP_y, Fe_xP_y and Ni_xP_y.

3. A method according to claim 1 or 2, wherein the silicon originates from any of elemental silicon and silicon of a silicon compound selected from at least any of the following compounds: silicon carbide, silicon boride and ferrosilicon.

4. A method according to any one of claims 1 - 3, wherein the melting depressant component comprises any of at least 35 wt% and at least 55wt% phosphorus and silicon.

5. A method according to any one of claims 1 - 4, wherein phosphorus constitutes at least 10 wt% of the phosphorus and silicon content of the melting depressant compound.

6. A method according to any one of claims 1 - 5, wherein silicon constitutes at least 55 wt% of the phosphorus and silicon content of the melting depressant compound.

7. A method according to any one of claims 1 - 6, wherein the melting depressant component comprises less than 50 wt% metallic elements.

8. A method according to any one of claims 1 - 7, wherein the melting depressant component comprises less than 10wt% metallic elements.

9. A method according to any one of claims 1 - 8, wherein the first metal part comprises a thickness of 0.3 - 0.6 mm and the applying (201) of the melting depressant composition (14) comprises applying an average of 0.02 - 1.00 mg phosphorus and silicon per mm^2 on the surface (15) of the first metal part (11).

10. A method according to any one of claims 1 - 8, wherein the first metal part comprises a thickness of 0.6 - 1.0 mm and the applying (201) of the melting depressant composition (14) comprises applying an average of 0.02 - 2.0 mg phosphorus and silicon per mm^2 on the surface (15) of the first metal part (11).

11. A method according to any one of claims 1 - 10, wherein the surface (15) has an area (A1) that is larger than an area (A2) defined by the contact point (16) on said surface (15), such that metal in the melted metal layer (21') flows to the contact point (16) when allowing (204) the joint (25) to form.

12. A method according to claim 11, wherein the area (A1) of the surface (15) is at least 3 times larger than the area (A2) defined by the contact point (16).

13. A method according to claim 11 or 12, wherein the area (A1) of the surface (15) is at least 10 times larger than a cross-sectional area (A3) of the joint (25).

14. A method according to any one of claims 1 - 13, wherein any of the first metal part (11) and the second metal part (12) comprises a plurality of protrusions (28, 29) that extend towards the other metal part, such that, when bringing (202) the second metal part (12) into contact with said surface (15), a plurality of contact points (16, 116) are formed on said surface (15).

15. A method according to any one of claims 1 - 14, wherein the first metal part comprises one of

- >50 wt% Fe, <13 wt% Cr, <1 wt% Mo, <1 wt% Ni and <3 wt% Mn,
- >90 wt% Fe,
- >65 wt% Fe and >13wt% Cr,
- >50 wt% Fe, >15.5 wt% Cr and >6 wt% Ni,
- >50 wt% Fe, >15.5 wt% Cr, 1-10 wt% Mo and >8 wt% Ni,
- >97 wt% Ni,
- >10 wt% Cr and >60 wt% Ni,
- >15 wt% Cr, >10 wt% Mo and >50 wt% Ni,
- >70 wt% Co,
- >80% Cu, and
- >10 wt% Fe, 0.1-30wt% Mo, 0.1-30 wt% Ni and >50 wt% Co.

16. A product comprising a first metal part (11) that is joined with a second metal part (12) according to the method of any one of claims 1-15, the metal parts (11, 12) having a solidus temperature above 1000 ºC and comprising a joint (25) that comprises at least 50 wt% metal that, before the heating (203), was part of any of the first metal part (11) and the second metal part (12).

17. A melting depressant composition for joining a first metal part (11) with a second metal part (12) according to a method of any one of claims 1 - 15, the melting depressant composition comprising i) a melting depressant component that comprises phosphorous and silicon for decreasing a melting temperature, and ii), optionally, a

binder component for facilitating applying (201) of the melting depressant composition (14) on the first metal part (11).