CLAIMS

1. A high temperature iron-chromium-aluminium alloy tube (1) extending along a longitudinal axis (C),

characterised in

that the tube (1) is formed from a continuous strip (3) of iron-chromium-aluminium alloy and that the tube (1) comprises a helical welded seam (2);

wherein the tube (1) has almost a constant inner diameter (d) or a constant inner diameter (d) along a longitudinal axis (C); and

wherein the high temperature iron-chromium-aluminium alloy comprises:

5–25 wt.% Cr;

2.5–8 wt.% Al;

0–5 wt.% Mo;

the balance being Fe and normally occurring impurities, and optionally other intentionally added alloying elements.

2. The high temperature iron-chromium-aluminium alloy tube according to claim 1, wherein the tube (1) has a wall thickness (t) of 0.5–7.5% of an inner diameter (d) of the tube (1).

3. The high temperature iron-chromium-aluminium alloy tube according to claim 2, wherein the tube (1) has a wall thickness (t) of 0.5–4.5% of an inner diameter (d) of the tube (1).

4. The high temperature iron-chromium-aluminium alloy tube according to any one of the preceding claims, wherein the helical welded seam (2) extends at a helix angle (α) of 1 to 89° with respect to the longitudinal axis (C) of the tube (1).

5. The high temperature iron-chromium-aluminium alloy tube according to claim 4, wherein the helical welded seam (2) extends at a helix angle (α) of 40–70° with respect to the longitudinal axis (C) of the tube (1).

6. The high temperature iron-chromium-aluminium alloy tube according to any one of the preceding claims, wherein the high temperature iron-chromium-aluminium alloy comprises:

9–25 wt.% Cr;

2.5–8 wt.% Al;

0–5 wt.% Mo;

the balance being Fe and normally occurring impurities, and optionally other intentionally added alloying elements.

7. The high temperature iron-chromium-aluminium alloy tube according to any one of the preceding claims, wherein content of Cr in the high temperature iron-chromium-aluminium alloy is of from 11 to 17 wt.%.

8. The high temperature iron-chromium-aluminium alloy tube according to any one of the claims 1 to 6, wherein content of Cr in the iron-chromium-aluminium alloy is of from 5 to 15 wt.%.

9. The high temperature iron-chromium-aluminium alloy tube according to any one of the claims 1 to 6, wherein content of Cr in the iron-chromium-aluminium alloy is of from 20.5 to 25 wt.%.

10. The high temperature iron-chromium-aluminium alloy tube according to any one of the preceding claims, wherein content of Al in the high temperature iron-chromium-aluminium alloy is more than 3 to 7 wt.%.

11. The high temperature iron-chromium-aluminium alloy tube according to claim 10, wherein content of Al in the high temperature iron-chromium-aluminium alloy is of from 4 to 6 wt.%.

12. The high temperature iron-chromium-aluminium alloy tube according to claim 10, wherein content of Al in the high temperature iron-chromium-aluminium alloy is of from 5 to 7 wt.%.

13. The high temperature iron-chromium-aluminium alloy tube according to any preceding claims, wherein content of Mo in the high temperature iron-chromium-aluminium alloy is of from 1 to 4 wt.%.

14. The high temperature iron-chromium-aluminium alloy tube according to claims 1 to 8 and 10 to 11, wherein content of Si in the high temperature iron-chromium-aluminium alloy is of from 0.1 to 3 wt.%, such as 0.5 to 3 wt.%, such as 0.10–0.70 wt.%.

15. The iron-chromium-aluminium alloy tube according to any one of the preceding claims, wherein the high temperature iron-chromium-aluminium alloy comprises one or more elements selected from:

0.05–0.60 wt.% Y;
0.01–0.40 wt.% Zr;
0.05–0.50 wt.% Hf;
0.05–0.50 wt.% Ta;
0–0.10 wt.% Ti;
0.01–0.05 wt.% C;
0.01–0.06 wt.% N;
0.02–0.10 wt.% O;
0.05–0.50 wt.% Mn;
0–0.08 wt.% P;
0–0.005 wt.% S.

16. The iron-chromium-aluminium alloy tube according to any one of claims 1–9, wherein the iron-chromium-aluminium alloy comprises one or more elements selected from :

0.01–0.1 wt.% C;
0.001–0.1 wt.% N;
0.02–0.10 wt.% O;
0–0.01 wt.% B;
0–0.5 wt.% Mn;
0–2.2 wt.% Y;
0–0.2 wt.% Sc+Ce+La;
0–1.7 wt.% Ti;
0–0.4 wt.% Zr:
0–0.4 wt.% Nb:

0–0.1 wt.% V:
0–0.3 wt.% Hf+Ta+Th.

17. A method of manufacturing an high temperature iron-chromium-aluminium alloy tube (1) having almost a constant or almost constant inner diameter extending along a longitudinal axis (C), ***characterised in*** that it comprises the steps of:

- feeding a continuous strip (3) of an high temperature iron-chromium-aluminium alloy toward a tube shaping station (4),
- helically winding the strip (3) in the tube shaping station (4) such that long edges (6, 7) of the strip (3) abut each other and a rotating tube (1) moving forward in a direction parallel to its longitudinal axis (C) is formed,
- continuously joining said abutting long edges (6, 7) together in a welding process directly when the high temperature FeCrAl alloy tube (1) is formed, whereby a welded high temperature FeCrAl alloy tube (1) comprising a helical welded seam (2) is obtained,
- annealing the high temperature FeCrAl alloy tube (1) subsequently to the welding process.

18. The method according to claim 17, wherein the welding process is selected from a fusion welding process or a solid state joining process.

19. The method according to claim 17, wherein the welding process is selected from one of a tungsten inert gas welding

process, a metal inert gas welding process, a laser welding process, and a plasma arc welding process.

20. The method according to any one of claims 17–19, wherein a shielding gas is used during the welding process, which shielding gas is an inert gas.

21. The method according to claim 20, wherein the shielding gas consists of Argon, Helium, or a mixture thereof.

22. The method according to any one of claims 17–21, further comprising the step of preheating the strip (3) prior to forming the high temperature FeCrAl alloy tube (1).

23. Use of a high temperature iron-chromium-aluminium alloy tube according to any one of claim 1 to 16 as a radiant tube in an electric heating device having a heating element in the form of a heating wire, as a muffle tube, a thermocouple protection tube, a retort tube or a furnace tube.